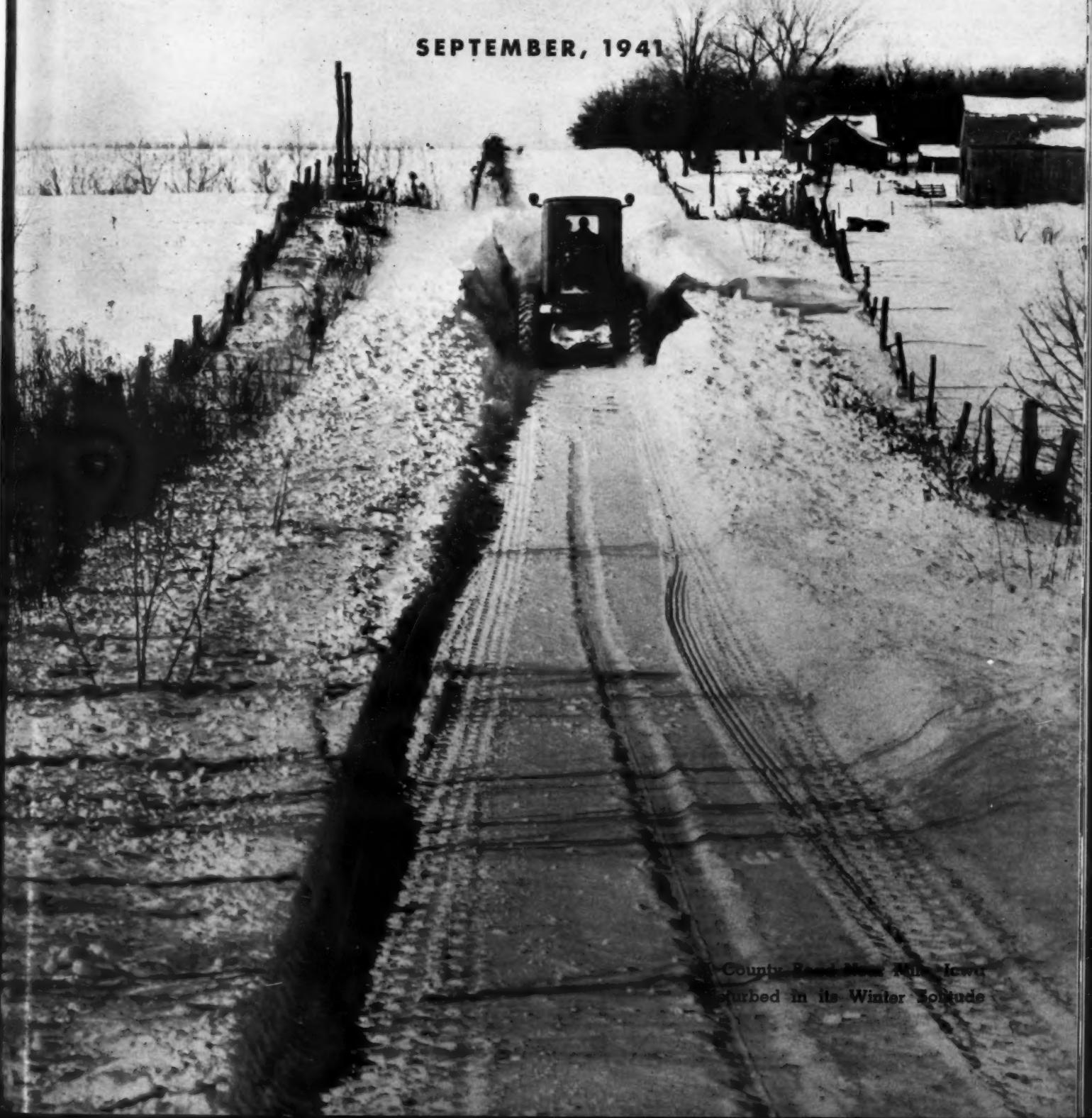
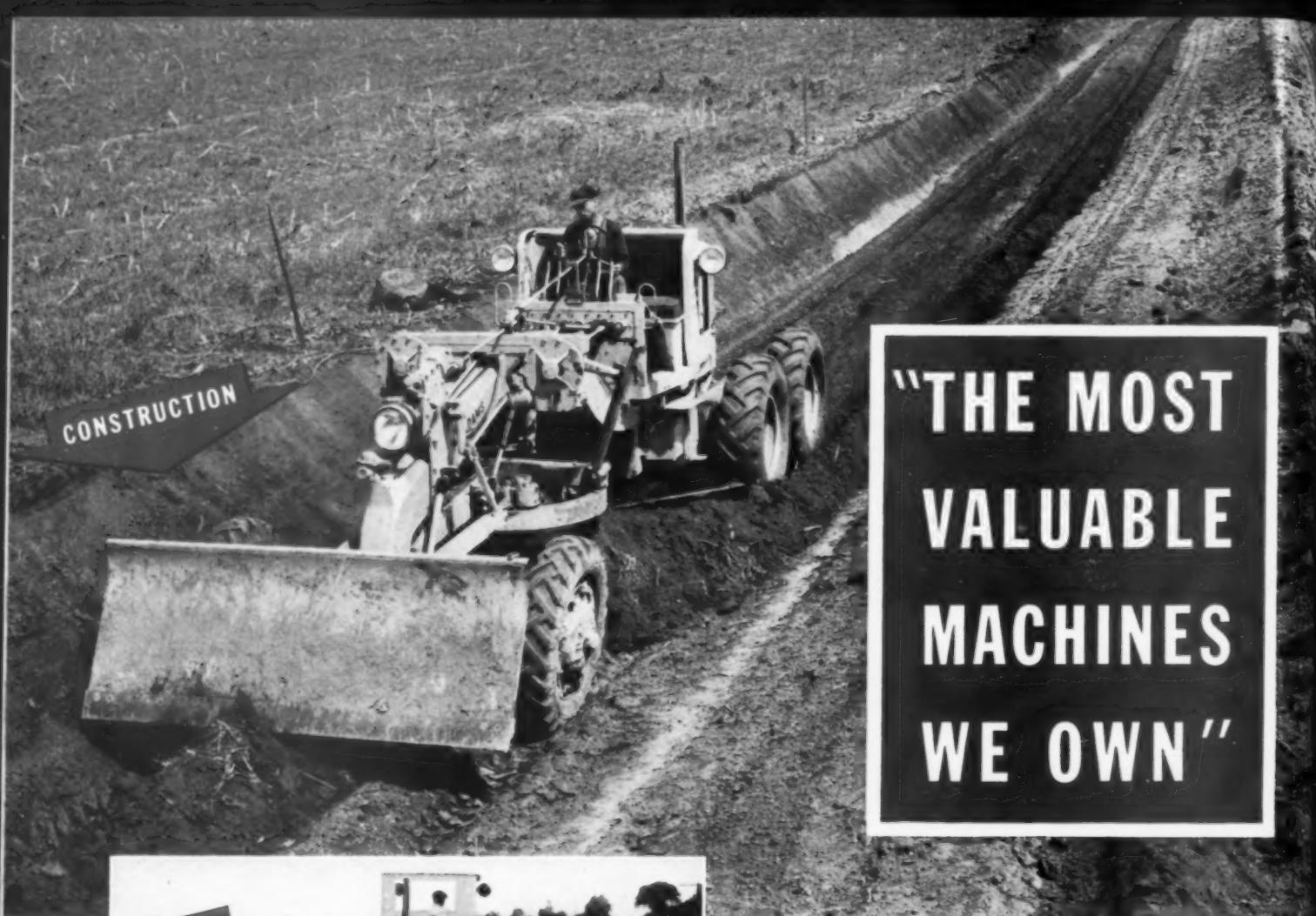


ROADS AND STREETS

SEPTEMBER, 1941



County Road Near Miles, Iowa
Unsettled in its Winter Solitude



**"THE MOST
VALUABLE
MACHINES
WE OWN"**



FROM THE standpoint of utility I figure that our Adams Motor Graders are about the most valuable machines we own," says a prominent contractor. "We cut down banks with them, cut ditches, maintain haul roads, level fills, and finish the grades. We prefer Adams because of their rigidity and positive controls for accurate adjustments." * * * "If I had to choose one machine to do all of my road work it would be an Adams Motor Grader because I never saw any one machine that can do so many kinds of work and do them all well," says a county engineer. "We use ours for all kinds of surface work—heavy maintenance, high-speed maintenance, scarifying, oil mix—and use it a lot for rebuilding roads from bank to bank. During the winter we put a snow plow on it and it does a real job of snow removal."

Whether you are highway official or contractor, you will like Adams Motor Graders best for all around and year 'round use. Available in six models with Diesel and gasoline engines. Ask your local Adams representative about them or write for catalogs to

J. D. ADAMS COMPANY, INDIANAPOLIS, INDIANA
Sales and Service throughout the World

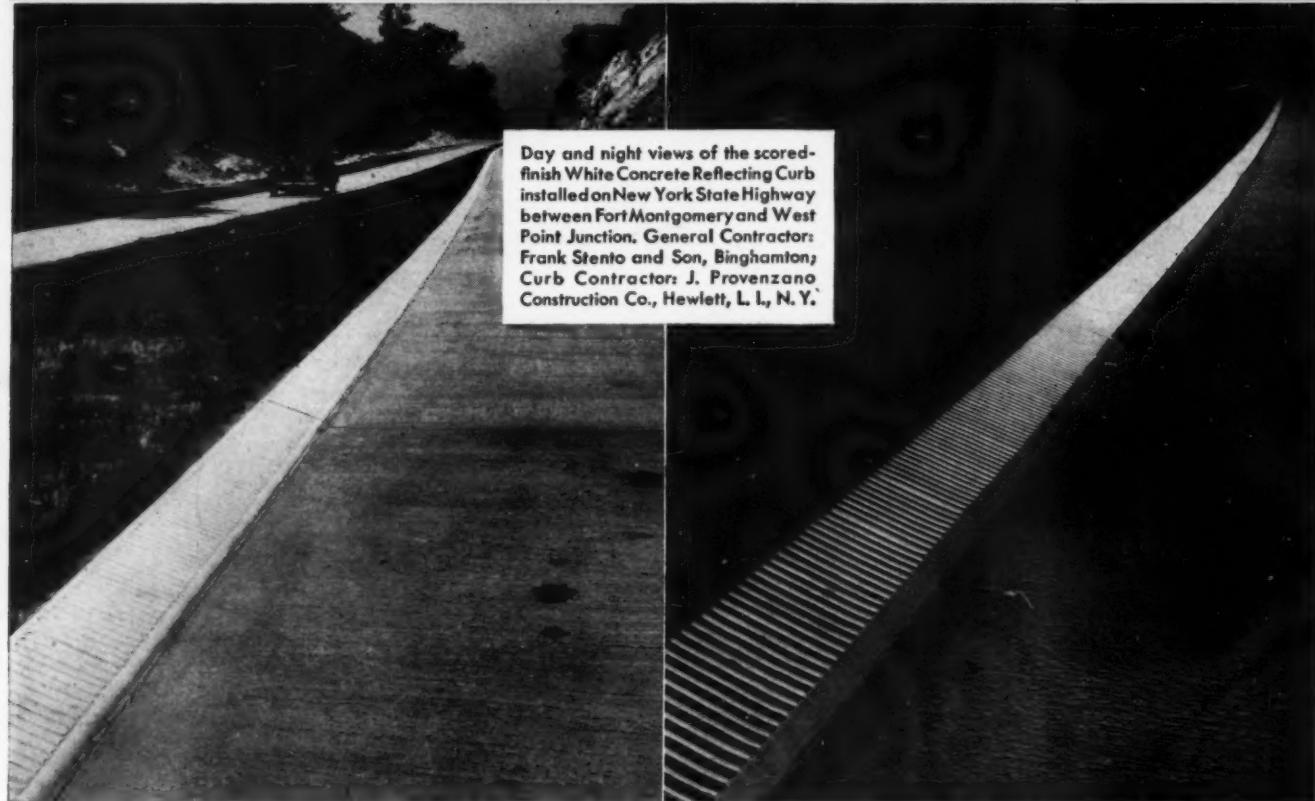
THE ADAMS LINE ALSO INCLUDES:

- Leaning Wheel Graders—6½ to 12 ft. blade sizes. Hand and power operated.
- Elevating Graders—with 42 in. or 48 in. carriers. Fully power operated.
- Hauling Scrapers—cable controlled. Available in several sizes.
- Tamping Rollers—have exclusive removable foot feature which increases range of application.
- Road Maintainers—multiple-blade type, automatic blade control feature. For high-speed operation (up to 15 m.p.h.) behind trucks or tractors.
- Miscellaneous Tools—Rotary Scrapers, Plows, etc. Blades for all types and makes of road machines.

ADAMS
Motor Graders

NEW YORK INSTALLS NEW SAFETY CURB

White Concrete Reflecting Curb greatly increases visibility and promotes safety on West Point Highway



NEW YORK has joined the steadily growing list of states that have installed or specified White Concrete Reflecting Curb—a new safety curb that reduces accidents by greatly increasing highway visibility, especially at night.

Visibility of a highway at night is largely dependent upon two factors: (1) efficiency of the driver's headlights; and (2) reflection of the headlight rays back to the driver's eyes.

Just as headlights would be ineffective if pointed to the rear, so is curb ineffective if the headlight rays fall upon a curb surface which does not reflect that light back to the driver's eyes. An

object to be visible under car headlights must reflect the light back to the driver, not away from the driver. The more light the object reflects back to the driver, the more visible it is. This is true of curb. Curb is highly visible under car headlights when it reflects light in the proper direction; namely, back to the driver. Direction of the reflection is as important as the amount of reflected light.

For correct direction of reflection, White Concrete Reflecting Curb is of a saw-tooth design. For maximum amount of reflection, Atlas White cement is used because: (1) white surfaces reflect whereas dark surfaces absorb light; and

(2) white concrete stands out in sharp contrast to surrounding objects, particularly at night.

The first complete book on White Concrete Reflecting Curb is yours for the asking. Mail the coupon today for your copy. Its 32 pages include theory, types, plans, and specifications. Universal Atlas Cement Co. (United States Steel Corporation Subsidiary), Chrysler Building, New York City.

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WHITE CONCRETE REFLECTING CURB

MADE WITH ATLAS WHITE CEMENT



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ROADS and STREETS

With which have been merged GOOD ROADS and ENGINEERING & CONTRACTING

ESTABLISHED 1892

Published Monthly by GILLETTE PUBLISHING COMPANY, 330 South Wells Street, Chicago, Illinois

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This Magazine Is Devoted to

Design, Construction, Maintenance and Operation of Highways, Streets, Bridges
and Grade Separations; Also Construction and Maintenance of Airports

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Vol. 84

SEPTEMBER, 1941

No. 9

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FRONT COVER PHOTOGRAPH, COURTESY CATERPILLAR TRACTOR CO.

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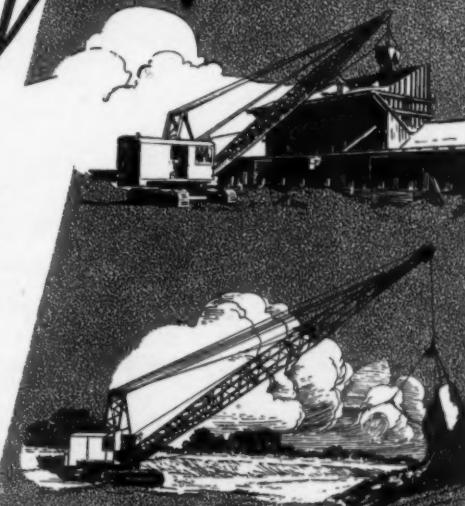
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*to have
a REAL
ROCK
SHOVEL*

AS the defense ball of orders and construction grows,
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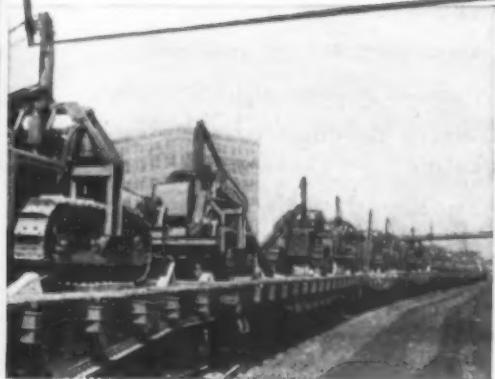


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It will continue to be this Company's No. 1 job to supply all possible power for the greater strength and security of the United States of America.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago, Illinois



The going's muddy, but the International TD-6 moves lumber speedily on this housing project in Washington, D. C.



Up-to-date road building in a residential development near Philadelphia, with an International TD-18 Diesel TracTractor and scraper.



Shaping a drainage ditch in Scott County, Mississippi, with an International TD-14 Diesel TracTractor and 10-foot grader.

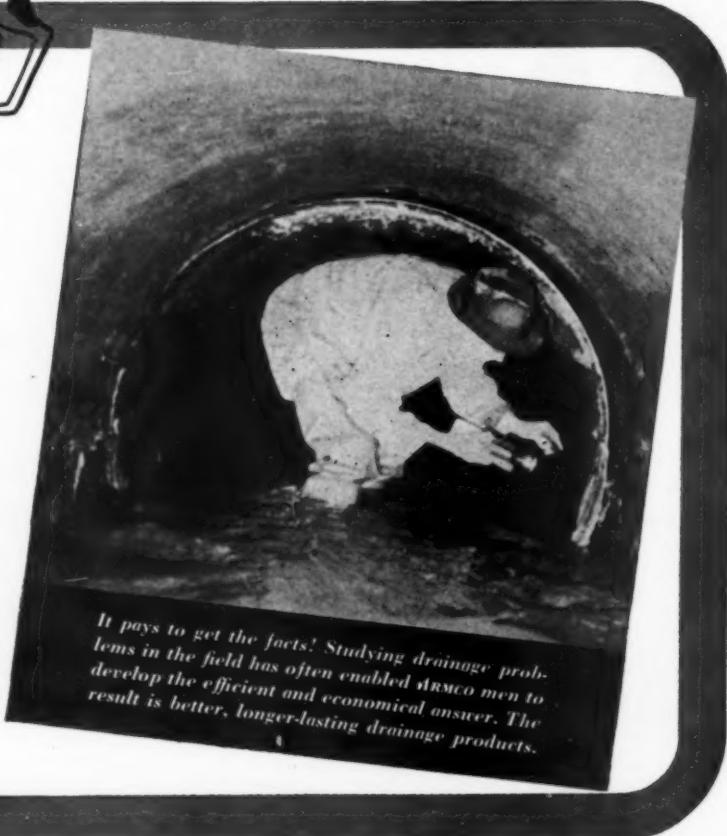
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THEY'RE NOSEY

...for a good purpose



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meet every condition and help simplify design problems. Many of these products were originated and developed by ARMCO engineers. From every angle — strength, durability, economy—they offer you the best that modern research and manufacturing can produce.

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ARMCO



Drainage Products

FEATURES

THAT DEFEND YOUR SPECIAL INTERESTS

What makes a shovel "tick" is of vital concern to every contractor. It provides him with a basis for determining the merits of digging equipment before he buys. Study the MARION features described here in that light. They back MARION'S DEPENDABLE PERFORMANCE every yard of the way . . . giving sound reasons for modernizing with MARIONS.

THE MARION STEAM SHOVEL COMPANY
MARION, OHIO, U. S. A.



MARION

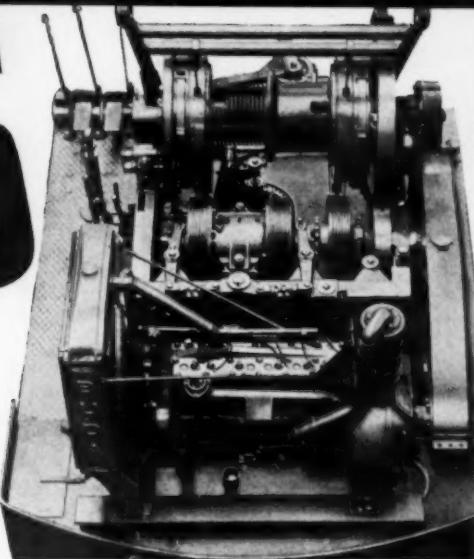
CRANES • DRAGLINES • SHOVELS • PULL-SHOVELS • CLAMSHELLS • WALKERS
From $\frac{3}{4}$ cu. yd. to 35 cu. yds. • Gasoline • Diesel • Electric

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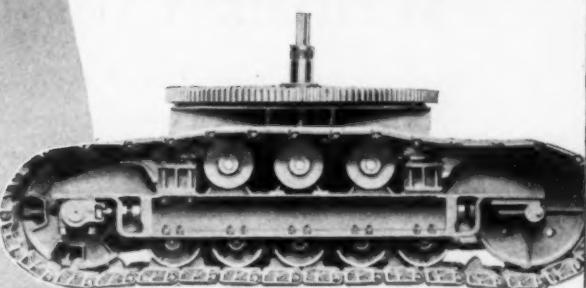
DIPPER

Built for heavy duty service. Every Marion dipper, no matter how it is designed or constructed, is provided with the necessary strength and lasting qualities to meet the severest kind of usage.



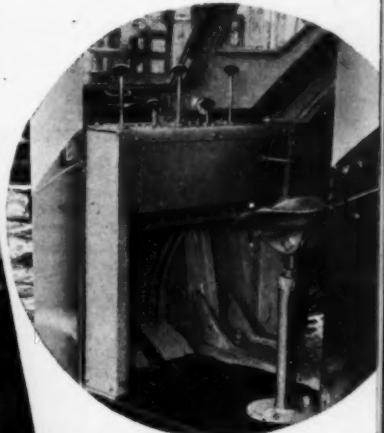
OPERATING MACHINERY

Compact . . . accessible . . . for ease of maintenance and operating simplicity.



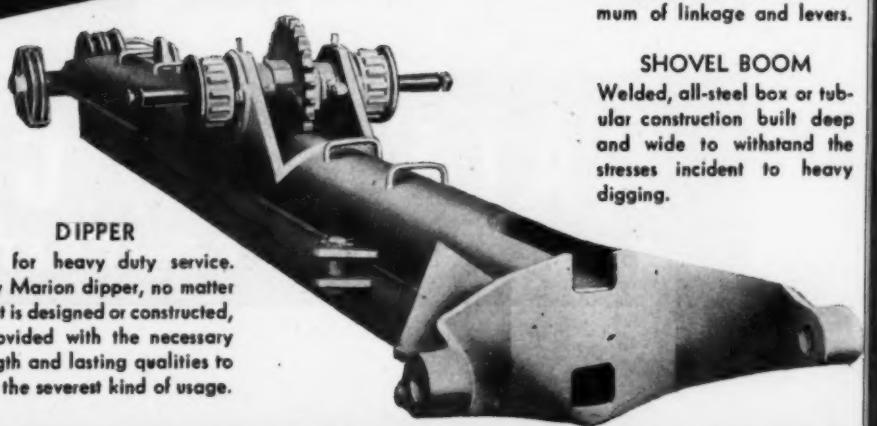
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Maximum strength with light weight, self-cleaning, non-clogging, non-binding crawlers.



AIR CONTROL

of all operating movements introduces finger-tip control and a new conception of accuracy over all previous methods, and with a minimum of linkage and levers.



SHOVEL BOOM

Welded, all-steel box or tubular construction built deep and wide to withstand the stresses incident to heavy digging.

Calcium Chloride

Used In The Mix To Speed Up and Protect Winter Construction of Sewage Plant

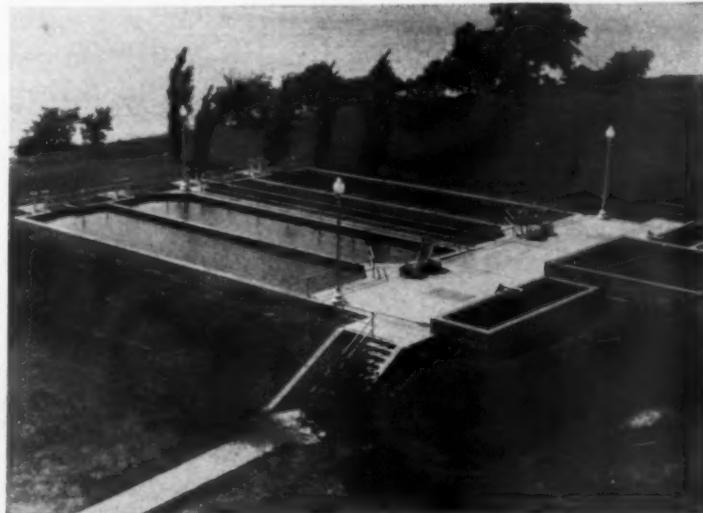
During winter construction of this most modern sewage disposal plant at Washington, D. C., specifications required the use of calcium chloride whenever temperatures were expected to reach 50° Fahrenheit or lower.

Research shows that concrete containing calcium chloride placed at air temperatures 44-48° acquired necessary stiffness for finishing in almost exactly the same time as plain concrete placed at ideal air temperature 70°. The addition of calcium chloride thus makes up for the lag in setting time which occurs when plain concrete is placed in cold weather. This acceleration of set shortens the time when cold weather protection and covering are necessary.

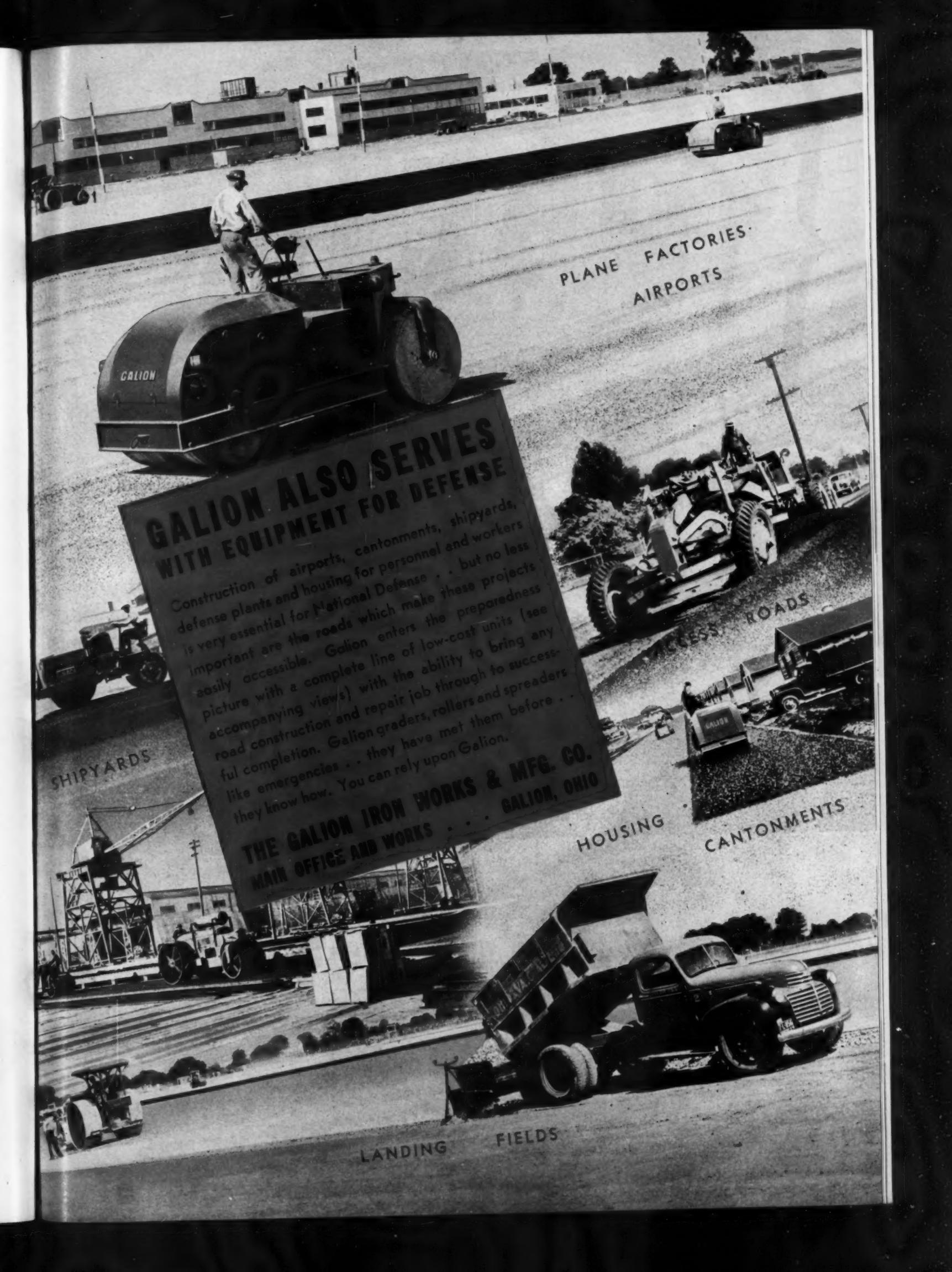
Concrete containing calcium chloride had 675 lbs. transverse strength at 3 days as against 415 lbs. for plain concrete—a gain of 63% in strength through use of calcium chloride. This high early strength gets concrete out of danger quickly.

Write for bulletins covering the use of calcium chloride in cold weather concreting and where speed and quality are important.

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Construction of airports, cantonments, shipyards, defense plants and housing for personnel and workers is very essential for National Defense . . . but no less important are the roads which make these projects easily accessible. Galion enters the preparedness picture with a complete line of low-cost units (see accompanying views) with the ability to bring any road construction and repair job through to successful completion. Galion graders, rollers and spreaders like emergencies . . . they have met them before . . . they know how. You can rely upon Galion.

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SHIPYARDS

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CANTONMENTS

LANDING FIELDS

TRACTION ...No. 1 Secret



Look at that load of crushed rock ahead of the blade. Power, traction, and the all-around strength and solid construction to stand up on such tough work are factors in getting defense jobs done on schedule. This "Caterpillar" Diesel No. 12 Motor Grader is building road at Camp Funston, Fort Riley, Kansas.

Low operating cost is a built-in principle of all "Caterpillar" equipment. This "Caterpillar" Diesel No. 12 Motor Grader is scarifying runways for the construction of an airport at Augusta, Georgia. It does this job on about $2\frac{1}{2}$ gallons of 8-cent fuel per hour.

et of Efficient Grading



ONE of the big reasons why "Caterpillar" Diesel Motor Graders are first choice on American roads is their *traction*. Watch one of those big No. 12s ditching, scarifying or spreading rock. You'll see that all the weight of the husky engine rides squarely over the low-pressure tires on the driving wheels — gives them tremendous gripping power on almost any surface.

Because of their unparalleled traction, "Caterpillar" Diesel Motor Graders have huge blade capacity and an appetite for fast, steady, economical work on the toughest jobs.

When America plunged into the defense effort, the first call was for "Caterpillar" Diesel Tractors, Engines and Motor Graders. These machines, which have done so much to give the United States the finest system of roads and streets in the world, are today pitching in to help protect it.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS



↑ "Caterpillar" Diesel No. 12 Motor Grader windrowing subgrade for the new Air Base at Tallahassee, Florida. Sure traction, quick-acting mechanical controls, and an unequalled range of blade positions make this machine the favorite on defense airport work—as well as on civilian roads and airports.

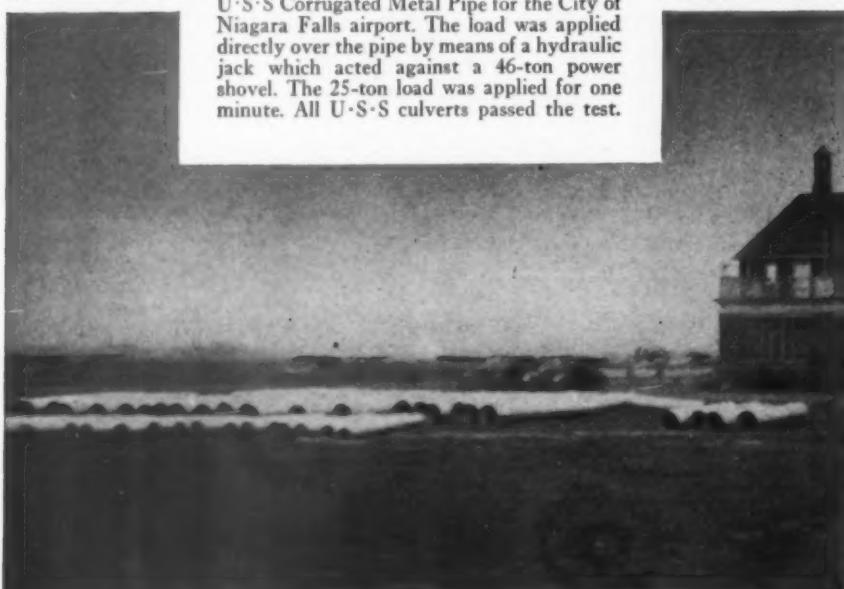
CATERPILLAR DIESEL

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ENGINES AND ELECTRIC SETS • TRACK-TYPE TRACTORS • ROAD MACHINERY

50,000 lbs. failed to crush these U·S·S airport culverts!



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HOW strong is Corrugated Metal Pipe? Airport authorities wanted to know the answer. They wanted to be sure that drainage pipe, if placed under runways, could withstand a static single wheel load of 50,000 pounds. As a test, a heavy power shovel was jacked up directly over each culvert. If the culvert could withstand this pressure without being crushed, it was approved for airport use. Every Corrugated Metal Pipe made of U·S·S Steel passed the test without failure.

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Made in both pure iron and Copper Steel, U·S·S Corrugated Metal Pipe is available from culvert manufacturers throughout the country.

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NIAGARA FALLS AIRPORT, showing corrugated metal pipe ready for the load tests. This pipe proved strong enough to withstand the weight of the heaviest planes built today.

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Scully Steel Products Company, Chicago, Warehouse Distributors

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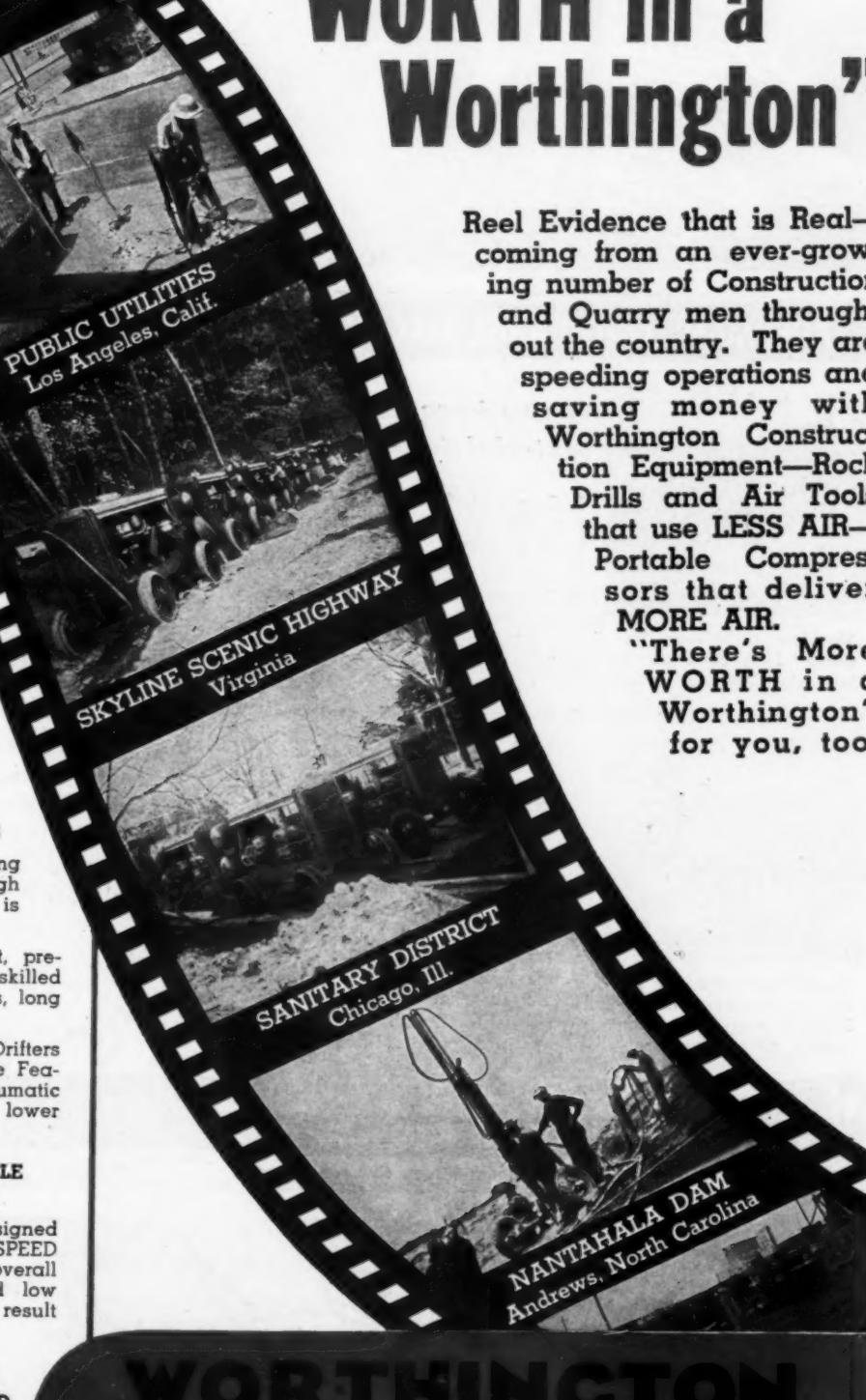
QUALITY: Forged steel throughout, precision-made parts, and highest skilled workmanship guarantee ruggedness, long life and low maintenance.

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- STRUCTURAL STEEL ALL-WELDED FRAME
- ROLLER BEARING WHEELS



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This advertisement of the original Hercules Powder Company appeared in the December, 1895, issue of a magazine called "Stone." The economy of Hercules Explosives for mining, quarrying, and construction, which was beyond doubt then, is even more widely recognized today.



HERCULES POWDER COMPANY
INCORPORATED
WILMINGTON • DELAWARE

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- ★ A tougher, harder, stronger steel
- ★ For Timken Axle Shafts and Gears!



Yours for years of service

After more than two years of experimental work and testing, we take pride in announcing that Timken Axaloy Steel is now being used in Timken Axle Shafts and Final Gears, and will be applied to other Timken Axle parts as rapidly as production permits.

Exhaustive laboratory and actual road tests have conclusively proved that Timken Axaloy Steel surpasses in strength, hardness and toughness the nickel alloy materials formerly used. The achievement of these qualities in a material containing no nickel will not only give Timken Axle parts greater ability to withstand tremendous stresses, twisting and strains, but will directly aid national defense

by releasing nickel to serve other vital needs.

In Timken's great engineering and testing laboratories, Timken Axle engineers are daily working to bring you better and yet better products. Specify Timken Axles when you buy your next truck. They're the Accepted Standard — *yours for years of service!*

TIMKEN AXLES

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICHIGAN
WISCONSIN AXLE DIVISION, OSHKOSH, WISCONSIN

THE FIRST ROUND OF B-E-U GOES INTO ACTION AT HENDERSON AIRPORT

YOU will find Bucyrus-Erie's building airports all over the country because their reliability and big output capacity can be counted on to help meet emergency and big output schedules. These four Bucyrus-Erie 8-yard scrapers (and a fifth not shown) are grading runways for Henderson airport in Florida, the fourth "sky job" they have handled since the defense program shifted into high. Working three 8-hour shifts per day, these scrapers have averaged 600 yards per unit per shift, good going on the tough-loading yellow sand at Henderson. Airport construction is only one of the direct and indirect defense jobs on which Bucyrus-Erie are at work all over the country. Plan now to put Bucyrus-Erie proved performance at work for you. Bucyrus-Erie Company, South Milwaukee, Wisconsin.

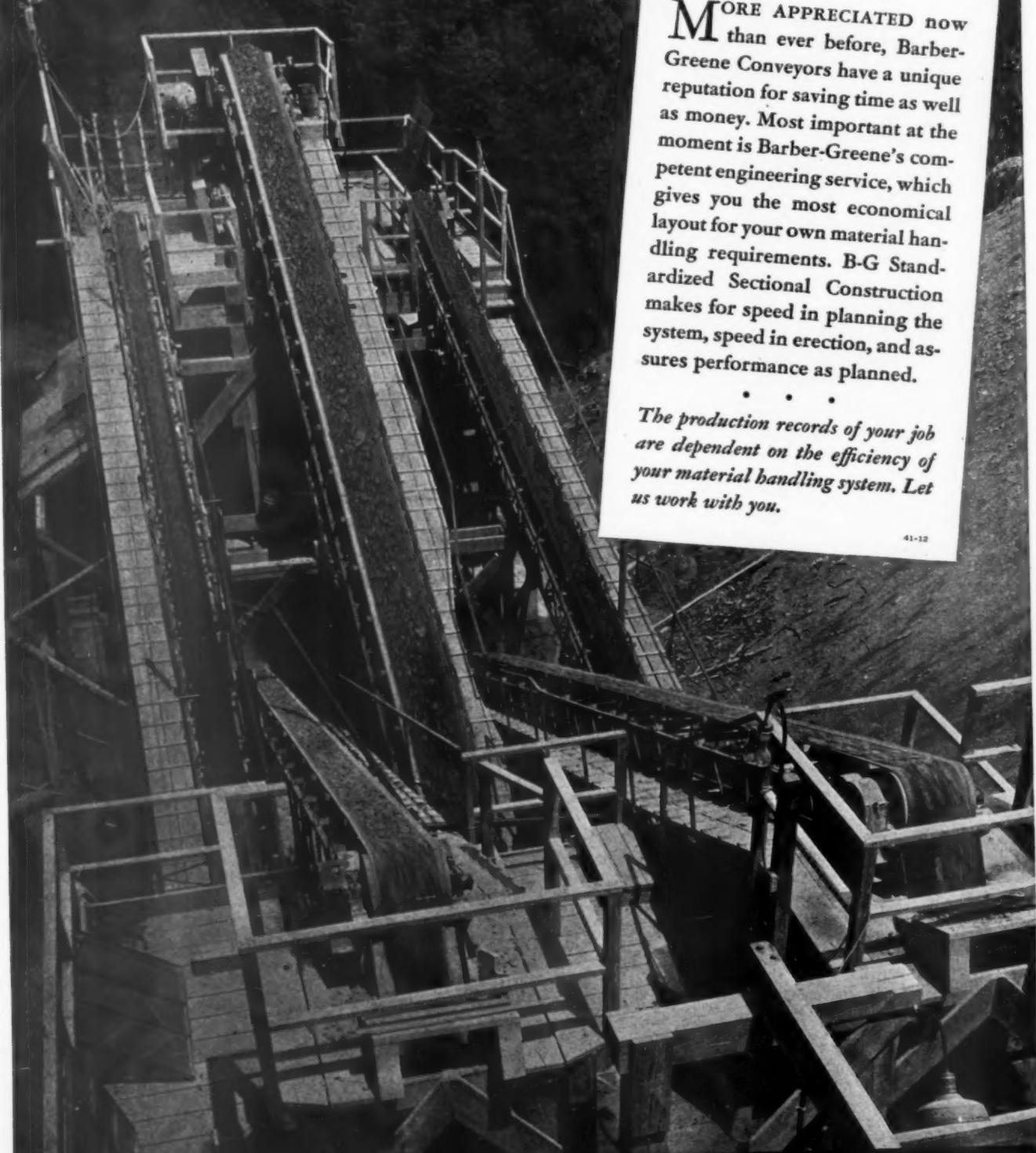
**BUCYRUS
ERIE**

V-7

EXCAVATING, DRILLING AND MATERIAL HANDLING EQUIPMENT

THE GROUNDWORK OF DEFENSE

Saving TIME ^{by the} TON

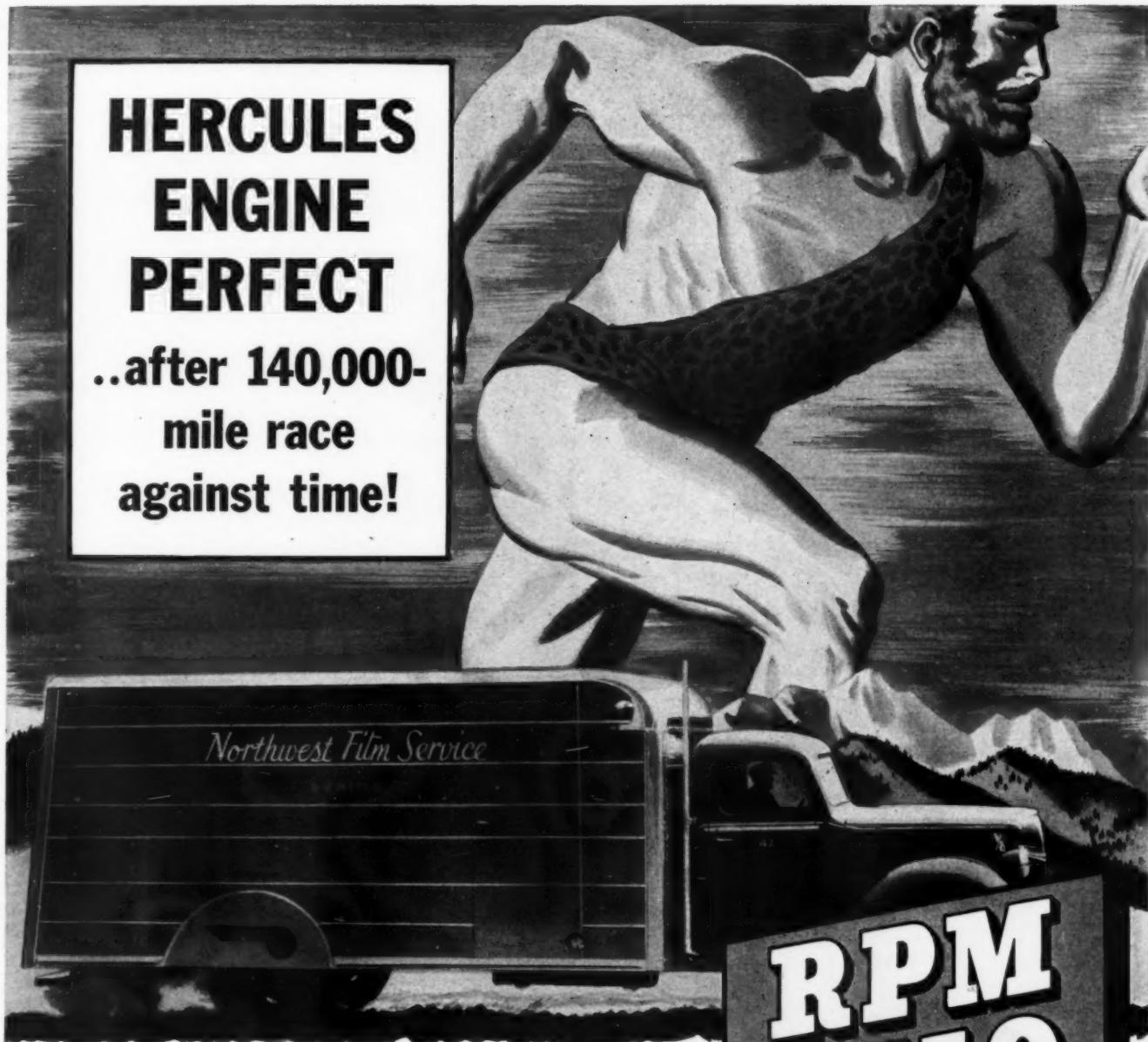


MORE APPRECIATED now than ever before, Barber-Greene Conveyors have a unique reputation for saving time as well as money. Most important at the moment is Barber-Greene's competent engineering service, which gives you the most economical layout for your own material handling requirements. B-G Standardized Sectional Construction makes for speed in planning the system, speed in erection, and assures performance as planned.

The production records of your job are dependent on the efficiency of your material handling system. Let us work with you.

41-12

BARBER  **GREENE**
AURORA ILLINOIS



HAVE YOU a herculean Diesel job? One where you MUST hit the ball day after day—one where costs must be kept 'way down... then see how RPM DELO helped the Northwest Film Service of Seattle:

Their job is to distribute films on a lightning-fast schedule—mile after mile—week after week—across rugged mountain ranges—all over the State of Washington. And do it at the gruelling rate of 10,000 miles a month—using one lone truck powered with a Hercules motor. Difficulties, now and then? Costly trouble? Not in 14 months! *Not in 140,000 miles!*

No wonder Fred J. Londry, executive of the film company, writes in! Yes, and he gives enthusiastic credit to his Hercules Diesel—and to RPM DELO that made this record performance possible!

So here's a tip—next time call for RPM DELO—the oil that ends ring, bearing and sludge trouble. Watch it cut costs.

ORDER RPM DELO Unequaled FOR YOUR DIESELS

Approved by the makers of over 95% of the installed Diesel horsepower in America, RPM DELO is marketed under the following names:

RPM DELO
Kysco RPM DELO • Sohio RPM DELO
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Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your locality.

STANDARD OIL COMPANY OF CALIFORNIA

LIMA crane owned by United Concrete Pipe Corp., Los Angeles.

The crane is equipped with a 140 ft. boom and 20 ft. hammerhead. The bucket, and contents weigh approximately 5000 pounds

**5000 lbs.
ON THE END
OF A 140' BOOM
AND 20' JIB**

Wherever crawler cranes are used, the name LIMA stands for "tops" in efficiency and performance. LIMA cranes have the facilities for doing work that ordinarily could not be done with a crawler crane. Their unusual stability, made possible by the use of cast steel truck and machinery base, low center of gravity, proper distribution of weight by placing machinery to rear of center pin, and long wide crawlers, enable them to complete difficult jobs with utmost precision and extra profits for their owners.

**LIMA LOCOMOTIVE WORKS, Inc.
SHOVEL and CRANE DIVISION, - - - LIMA, OHIO**

**SHOVELS
DRAGLINES
CRANES**

LIMA



Don't Gamble



with Somebody's Life!

**REPLACE UNSAFE
BRIDGES---Quickly and
at Low Cost with---**

TONCAN IRON SECTIONAL PLATE STRUCTURES

Today the Highway Engineer has an all-important responsibility. In his hands, and upon his skill and judgment rest the lives and safety of millions of motorists. High speed traffic requires *safér* roads.

To discharge this heavy responsibility the engineer must answer three questions. Are the bridges safe? Are they of the most economical type? Will they continue to carry traffic safely without frequent repairs and costly maintenance?

To all three of these questions the Highway Engineer can answer "Yes!" . . . when long-life, Toncan Iron Sectional Plate Pipe and Arches are used. He knows that hundreds of structures of this type are giving trouble-free service—that they will continue to give it. Call or write your local Toncan Iron Man. The Toncan Culvert Manufacturers Association, Republic Building, Cleveland, Ohio.



The engineer's job is simplified because Toncan Iron Sectional Plate Pipe and Arches are easy to design, order and erect.



Construction time is cut to a minimum: Toncan Iron Sectional Plates are factory-formed, matched and individually numbered for special designs . . . can be quickly erected at the location, usually with unskilled labor.

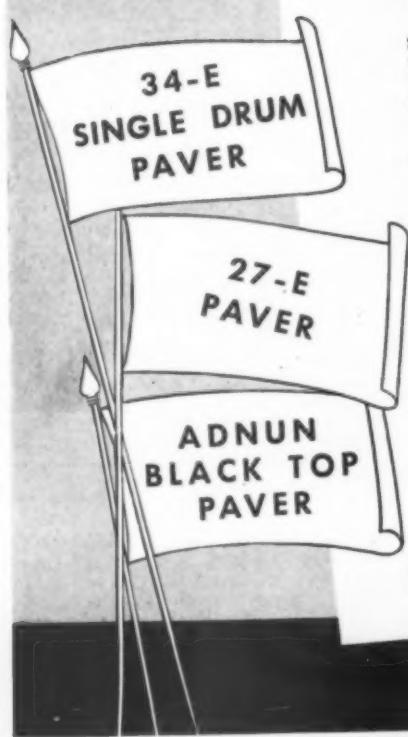


SPECIFY

The Alloy Iron that
grows old slowly.

TONCAN IRON
PRODUCT OF REPUBLIC STEEL

Here's a BIG PAVER that's not limited to BIG JOBS!



WHEN you buy a MultiFoote SINGLE DRUM 34-E, you're buying an all-purpose paver that has big capacity and speed to put down any road at a profit! City street or super-highway, the MultiFoote 34-E pays out. With no more men or equipment than with a 27-E you get 37.4 cubic feet in every batch on level ground and that's really rolling—White Consolidated, Inc., Chicago, put down 402 batches on a city street in 8 hours; E. A. Meyer, Winnetka, Ill. paved 1100 ft. of 9.9-7.9-9 slab in 8 hours in a State Highway in Southern Illinois; other 34-E SINGLE DRUM MultiFoote users report similar results.

The 34-E doesn't represent too big an investment in itself—it doesn't require any extra men or machines to handle its output—it's easy to maneuver and transport—and it has all the proved MultiFoote advantages including double cone drum—high operating platform; fast charging and quarter-turn discharge; fully enclosed travel gears running in oil; simple, easy-to-get-at mechanism; only one main shaft and all high speed shafts mounted on Timken bearings; heavy, long crawlers; accurate water system, oversize axles; rigidly braced frame.

Take the first step to bigger paving profits in '41—write for Catalog today!

THE FOOTE COMPANY, INC.
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PROOF! CARVED INTO THE ROCKS



P&H *of* EXCAVATORS

YES, there's more muscle and less fat per pound of excavator in these P&H's than you'll find in any other machine. But why not? They're the only excavators with both upper and lower structures built entirely of rolled alloy steels, all welded. They're tougher, faster, simpler in design, easier to operate.

The facts have been proved with faster, steadier digging on thousands of jobs, under all operating conditions.

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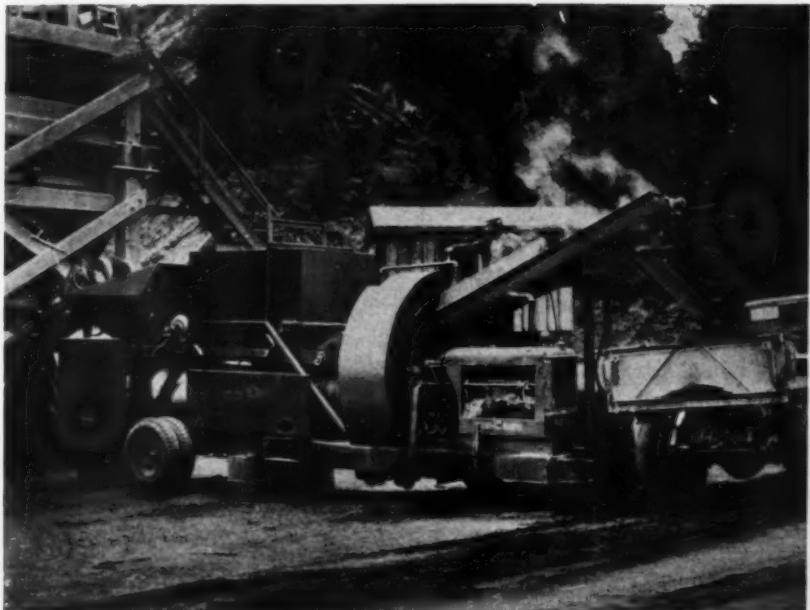
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BUILT — THAT'S P&H
ROLLED STEEL DESIGN

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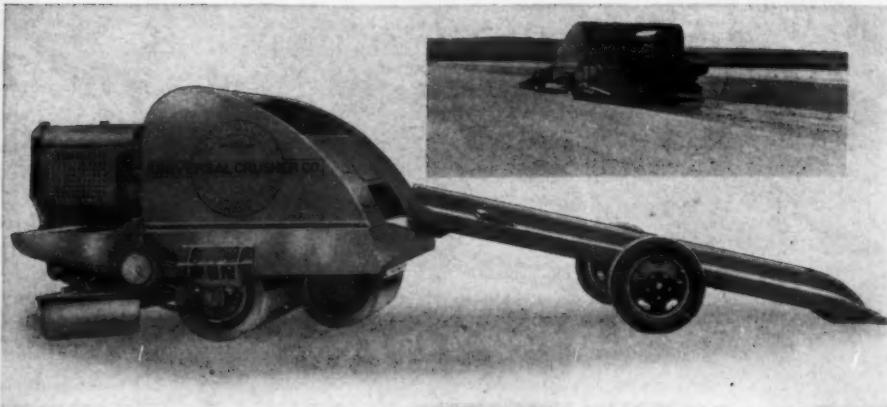
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After all, it's your funds these machines save!



Another Universal machine that's conserving road and street funds—the "Chip-Top" Spreaderoller. Seal coats airport runways quickly and at amazingly low cost, too. Screens material onto oiled base course in three layers—*fines on top*. Rolls them at same time—once over and you've got a smooth, water repellent, long lasting, high visibility, anti-skid wearing surface. Seal coats 10' wide roadway at a time—up to a mile an hour. Ask for the cost-cutting operating data.

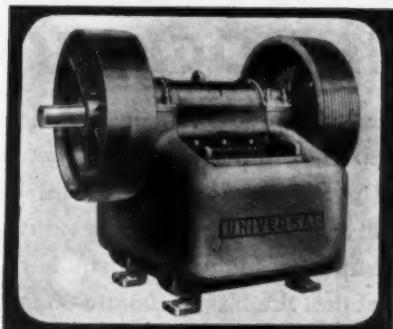
And the Universal "Twin Dryer" Asphalt Plant really saves worthwhile sums for cities, states, counties and contractors by producing a superior quality bituminous mix—at up to 42-tons per hour—and "Twin Dryers" cost less to begin with. Compare it with all comers. Only one compact unit always set up and ready to go—just light the heaters and feed in the materials. Two 13'6" rotary dryers, one for sand, one for gravel, and a 12' screw pug mill. Users say it's the keenest hot patch, maintenance and small paving contract machine on the market.



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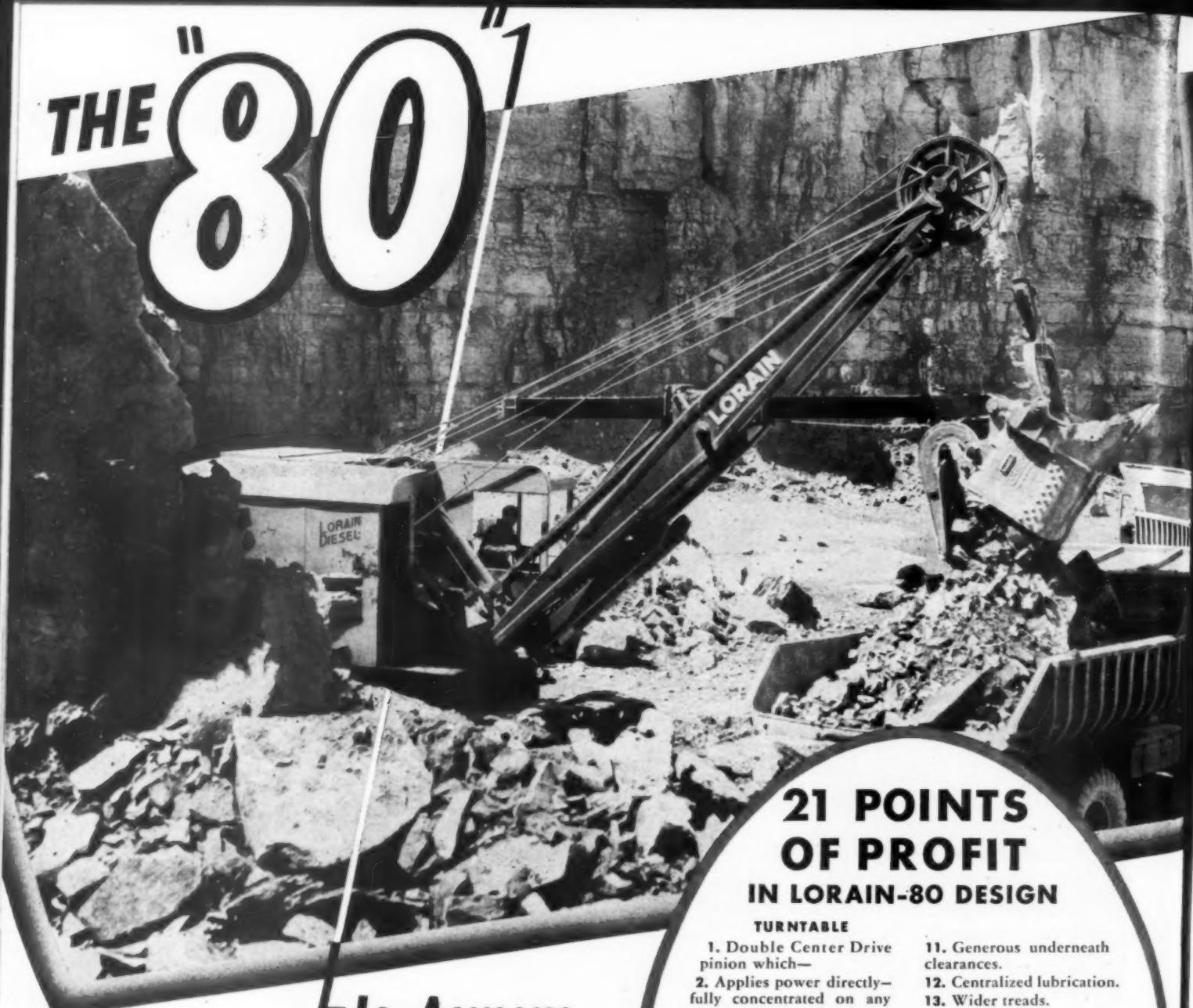
Universal "Streamlined" Crushers, Crushing Rolls, Pulverizers and Crushing Plants are the answer to today's defense needs for low cost crushed rock and gravel.



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THE "80"



IS ALWAYS IN THE PROFIT PICTURE ON THE ROCK JOBS . . .

Successful contractors can't sidestep rock jobs these days. Their only recourse is to select a shovel that can produce proof, not promises, concerning its ability to move rock in profitable quantities. The construction features shown here are one form of proof that the 1½-yd. Lorain-80 is designed from the ground up for rock service. Another is the number of "80's" that are drawing the front line rock assignments on some of the nation's biggest rock jobs.

Complete catalog data on the Lorain-80 is yours for the asking. First, check its many design features, then who is using this 1½-yd. machine, where and for what kind of work. You'll see why this shovel is such a vital part of the profit picture wherever rock is a factor.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

21 POINTS OF PROFIT IN LORAIN-80 DESIGN

TURNTABLE

1. Double Center Drive pinion which—
2. Applies power directly—fully concentrated on any one operation—
3. Or spreads power for high-speed simultaneous operations.
4. Two-piece swing drums designed to take the punishment of the hardest worked part of the shovel.
5. Crowd clutch, extra wide to deliver full digging power, mounted on roller bearings; two-piece, easily reversed bands.

CRAWLER

6. Center "Chain" Drive.
7. Two speeds either direction.
8. Steers either direction.
9. Safety travel and tread lock.
10. Mechanism runs in oil bath.

11. Generous underneath clearances.
12. Centralized lubrication.
13. Wider treads.

SHOVEL BOOM

14. All-welded (strength; all-steel; torsion-resisting).
15. All-steel dipper stick.
16. Door stops to protect stick.
17. Automatic power dipper trip.
18. Automatic crowd brake to hold stick extended.

CRANES, CLAMS, DRAGS

19. Simultaneous hoist, swing and travel (or boom derricking).
20. High-speed, worm-driven boom hoist — power and precision control of boom derricking and lowering.
21. "Cable-Miser" fair-lead with interlocking, geared sheaves.



**1½ YD.
LORAIN-80**

ROADS and STREETS

Vol. 84, No. 9

September, 1941

A GILLETTE PUBLICATION
ESTABLISHED 1906

AIRPORT USES HIGHWAY DESIGN

Alabama Cross Section Standards Adopted for Runways and Aprons

LIKE "Topsy," the South East Air Corps Training Center airport at Selma, Alabama, "just grew." Behind its growth, however, was the planning and supervision of a reserve corps captain who was formerly connected with the Alabama State Highway Department. Incidental to its construction but nevertheless the fundamental feature thereof is the direct application of an Alabama State Highway Department standard highway pavement cross-section to the runways, taxiways and warmup apron. This cross-section was adopted only after several long sessions with air corps officers in which the various types of construction were discussed. The argument which finally decided the type of runway paving to be used was a visit to the adjoining state highway, U. S. 80, over which 20-ton loads were being trucked.

This airport known as the Selma Advanced Flying School, is a short distance east of Selma, Alabama. It comprises about 2,000 acres of a sandy loam soil with a red clay sub-soil.

When Capt. Orr was assigned to this project he was given an aerial composite map of the area, taken out to it and left to his own resources to produce an airport with a usable, temporary runway, and a usable temporary parking and warming up apron by May 3, 1941. This was in September, 1940. The facilities were ready on time and now the more permanent types of construction are well on the way. The ground was fairly level, the deepest cut being about 6 ft., while water stood in ponds about a foot deep in other places.

Design

As shown by figure 1, there are four runways which are so arranged as to uniformly divide the compass. They are all 300 ft. wide. The lengths vary as follows:

No. 1—4,130 ft., No. 2—4,535 ft., No. 3—4,630 ft., and No. 4—4,580 ft. Lengths of the radii of the various fillets at intersections of runways are shown by figure 1. Where runways intersect their crowns are pulled to the same intersecting point and the valleys, resulting from the intersection of the cross-sections from different directions, are smoothed out so that no bump will result from an intersection.

The design of the cross-section is shown by figure 2. The thickness is a typical standard highway cross-section composed of an 8 in. base course of compacted sand-clay-gravel on a compacted subgrade, covered with a 1½ in. asphaltic concrete plant-mixed surface course.

As shown by figure 3, the crown is parabolic over the crest with continuation to the sides on a grade less than 1.5 per cent.

The grades lengthwise of the runway are also less than 1.5 per cent, the general slope of the field being toward the west.

Areas between runways and along the edges of the field are grassed and sloped so that drainage from the surface can be collected and conducted through sewers into adjoining drainage channels.

The present completed warm-up and parking apron is 300 ft. by 2,400 ft. and is to be increased to 450 ft. by 3,200 ft.

Proposed taxiways are 100 ft. wide. The following table gives coordinates of the runway crown points for various runway widths:

RUNWAY CROWN POINT COORDINATES

Runway Width	Dist. from C. L.	Crown Elev.
100 ft.	0 ft.	0.62 ft.
	25 ft.	0.37 ft.
	50 ft.	0.00 ft.
150 ft.	0 ft.	0.94 ft.
	25 ft.	0.74 ft.
	50 ft.	0.37 ft.
	75 ft.	0.00 ft.
200 ft.	0 ft.	1.25 ft.
	25 ft.	1.11 ft.
	50 ft.	0.74 ft.
	75 ft.	0.37 ft.
	100 ft.	0.00 ft.
300 ft.	0 ft.	1.88 ft.
	25 ft.	1.73 ft.
	50 ft.	1.48 ft.
	75 ft.	1.11 ft.
	100 ft.	0.74 ft.
	125 ft.	0.37 ft.
	150 ft.	0.00 ft.

Grading

To level off the 1,000 acre area under improvement about 1¼ million cubic yards of excavation are involved. The W.P.A. furnishes all common labor and supervision while the Hooper Construction Company furnishes and operates all equipment on the general leveling work. The arrangement upon which the job started was a bid for a grading outfit that would move 100 cu. yds. per trip. Hooper's bid was low for furnish-

ing, operating and maintaining eight 12-yd. Le Tourneau scrapers and D8 Caterpillar tractors. After the job started this was enlarged to fifteen 12-yd. scraper outfits, two 12-ft. Caterpillar motor graders, two sheep-foot roller units with a Caterpillar D8 towing four rollers tandem in one unit and a D7 towing two rollers tandem in the second unit. Besides these, three Le Tourneau bulldozers mounted on Caterpillar D8 tractors helped the scrapers and kept the dumps smooth. Accompanying pictures show the grading operations and the special grease truck built by the contractor to service the equipment.

Hooper has proven that it pays to keep an Alemite outfit with air compressor and lubricating oils handy on a special lubricating service truck. He also made up a special welding truck for maintenance of the equipment.

The grading equipment operates 24 hours a day in three shifts. Carbide lights are used for night work around the area while all grading units are equipped with electric lighting for night work.

Engineers set stakes so that no part of the entire field has more than a $1\frac{1}{2}$ percent grade. Because a large section is quite flat they have had to calculate very carefully in order to obtain any grade at all. Naturally cutting and filling amounts to little more than knocking off the bumps. The grading equipment has operated on a criss-cross pattern in leveling the ground. One difficulty encountered is that motorgraders are

not powerful or big enough to do leveling work too light for scrapers, so scrapers are employed.

Grassing

After the final ground surface grade is reached, the area is planted to Bermuda grass. As shown by an accompanying picture, this grass is piled along the area. The ground is fertilized with a mixture prepared for this type of soil when growing cotton. It consists of 6 parts nitrate, 8 parts phosphate, and 4 parts potash. It is plowed into the soil with single mule plows, as shown, about $2\frac{1}{2}$ in. under the surface at the rate of 800 lb. per acre. Men then follow along these furrows, drop and cover sprigs of Bermuda grass. They sprout

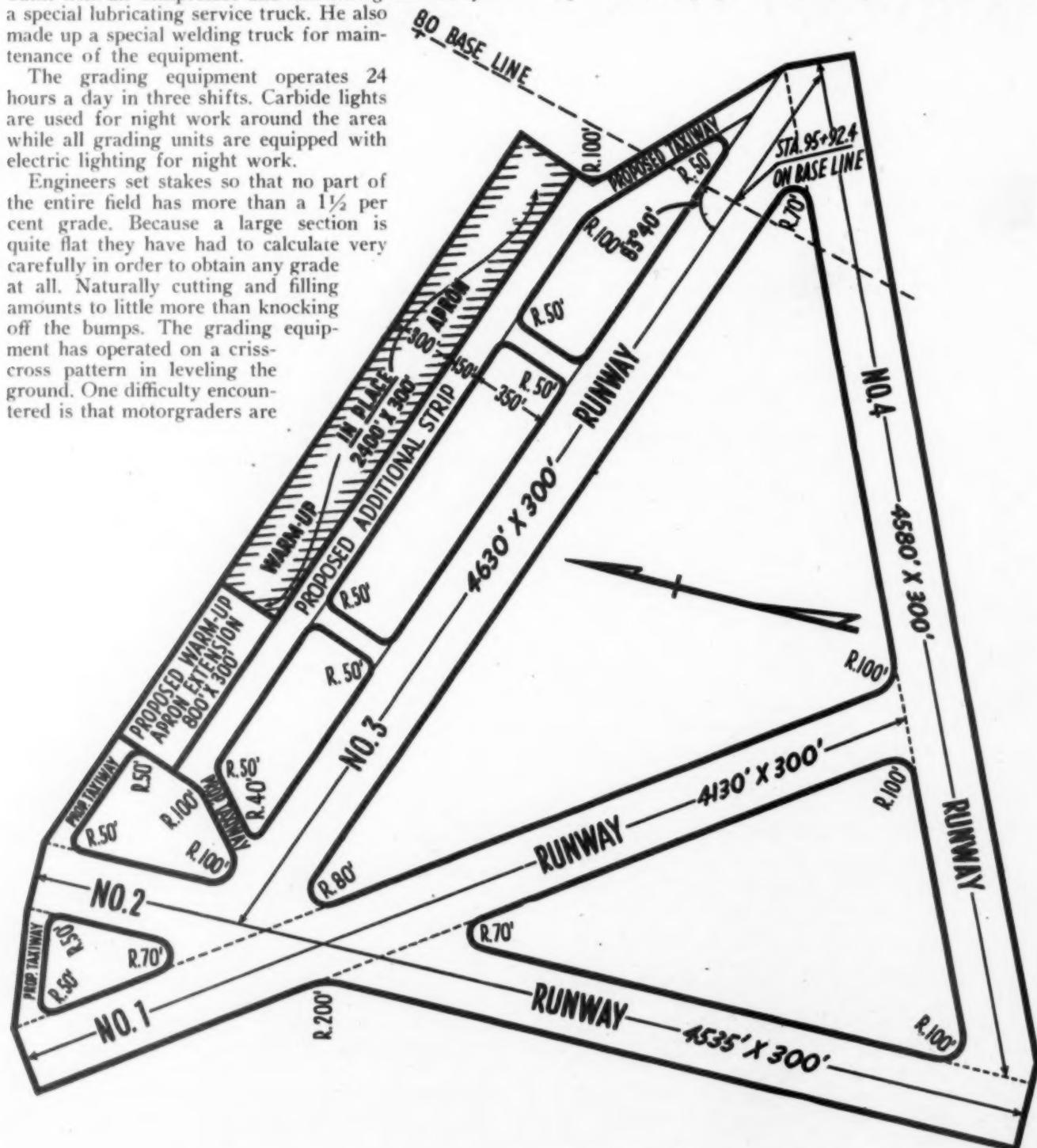


Fig. 1—General Layout of the South East Air Corps Training Center Airport.

in rows and at each joint a root and a sprout spring from contact with the soil. Soon the whole area is covered with a dense mat of sturdy grass.

Drainage

To date the only drainage, either surface or subsurface, is a line of open jointed, tongued and grooved, concrete pipe increasing in size from 15 in. diameter at the upper end to 36 in. diameter pipes at the outlet. It follows a low part of the terrain and taps the only wet spot evidenced on the job so far. The engineers expect this line to function as a subdrain equally as well as for a surface drain. Other lines will be installed as construction progresses.

Accompanying pictures show the sewer line and a closeup shows the joint opening provided on the 36 in. pipe. Galvanized $\frac{1}{4}$ in. mesh wire cut in strips 9 in. wide and long enough to reach most of the way around the pipe is placed over the open joint before the pipe is covered with gravel backfill.

The line was laid on top of the ground, so in order to keep the gravel backfill in place and porous, timber forms were built in panels and held in place along the sides of the pipe, about 9 in. away, to keep earth fill and gravel backfill apart. After the earth fill is complete the form panels are pulled out and moved ahead.

The top soil of the area is underlaid by a seam of clay with gravelly clay below that. Soft subgrade or soft earth surface is not a problem in this sandy soil. Dust, however, is a big problem and grass planting is proceeding as rapidly as an area is ready to be grased. The winds blow clouds of the impalpable powder across the fields.

Other drainage lines will be built to carry surface water under the runways, where necessary. The pipe sizes are designed for a 2 in. per hour rain fall. The section now being built is on a 0.26 per cent grade most of the way. Near the outfall a 0.4 per cent grade was secured.

Concrete pipe was lower in cost than corrugated metal pipe so all drains will be constructed with it.

Paving

Construction of the temporary runways and the warm-up and parking apron was performed by the

8" COMPACTED CLAY GRAVEL BASE 2" PLANT MIX SEAL

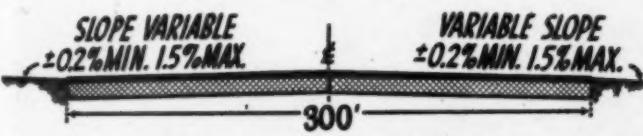


Fig. 2—Standard Cross-Section of Aprons, Taxiways, and Runways. This is a Standard Cold Mix Asphaltic Concrete Cross-Section of the Alabama State Highway Department.



Fig. 3—Showing the Various Crown Profiles for Various Widths of Runways.

Vandigriff Construction Company of Montgomery, Alabama. The two temporary runways were 300 ft. wide and 3,500 ft. long. Approximately 3 in. of clay-gravel from a field-side pit was spread and rolled. The



Fig. 4—One of a Fleet of 15 Le Tourneau 12-yd. Scrapers Drawn by Caterpillar D8 Tractors Knocking Off the Humps to a Grade Not Exceeding 1½ Per Cent. The Water Boy in the Foreground Carries a Bubbler. Grading Equipment Operates on Rental Basis.

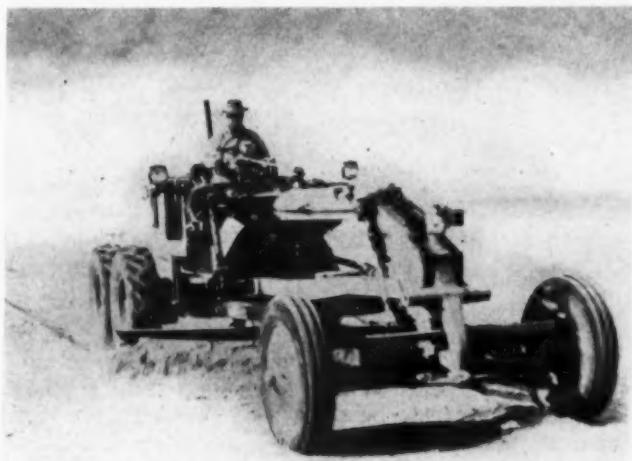


Fig. 5—Motorgrader Levelling Field. Cloud in Background is Dust Blowing Off the Wide Flat Expanse as Yet Ungrassed.



Fig. 6—Contractor Hooper's Grease Truck is a Good Investment. Carries All Required Oils and Greases. Air Compressor Provides Air Pressure.



Fig. 7—Fertilizing the Red Soil Preparatory to Planting the Bermuda Grass Sprigs Piled Up in Foreground.



Fig. 8—A 36 in. Concrete Pipe Drainage Line is Laid With Open Joints. Capt. Orr Removed Guard Stake to Get It Out of the Foreground.

top 1 in. was scarified and about 1½ lb. per sq. yd. of calcium chloride mixed into it. During the mixing and spreading operation this top inch set up so hard that it could scarcely be scratched. To keep the dust settled another ½ lb. per sq. yd. of calcium chloride was spread.

Warming Up Apron

Clay gravel was hauled from the borrow pit in trucks and windrowed on the compacted subgrade of the parking and warming-up apron. After spreading, it was rolled with a sheep's-foot compacting roller in two courses. Finish rolling was done with a pneumatic tired roller followed by a tandem roller. The sheep's-foot roller was used until the feet rode out. The base course material complied with following specification:

Requirements

Total Passing	Percent by Weight
2-in. sieve	100
1½-in. sieve	75 to 100
No. 4 sieve	35 to 85
No. 10 sieve	30 to 75

Material passing the No. 10 sieve is classed as soil binder and has the following analysis:

Total Passing	Percent by Weight
No. 40 sieve	35 to 95
No. 60 sieve	28 to 75
No. 200 (Combined silt and clay)	15 to 39
Clay (8 min. suspension by elutriation test)	9 to 35

The fraction passing the No. 200 sieve was considerably less than half the fraction passing the No. 40 sieve. The liquid limit of the No. 40 fraction was below 25 and the P I ran between 0 and 6.

It was entirely feasible to conform with these requirements because a bed of sand underlaid the gravel stratum over which was deposited about a 5 ft. layer of clay. A Lorain 1¼ yd. diesel shovel with Amsco bucket and a ½ yd. Bay City gas shovel worked in the pit. The large unit belongs to Vandigriff Construction Company and the smaller one to the Army for general maintenance work.

Eight inches of compacted sand-clay-gravel with a high bearing value was surfaced with about 2 in. (200 lb. per sq. yd.) of plant-mixed asphaltic concrete. Prior to placing the surface course, a primer coat of RT-3 was applied at the rate of 0.3 gal. per sq. yd. The surfacing is known in Alabama as the standard cold-mix of the Alabama Highway Department. It was mixed in a hot-mix plant, however, using AC-12 on the warm-up and parking apron. On future construction, AC-8 will be used instead of AC-12. Aggregate gradation conformed to the following specification:

Proportionate Amount (Square Mesh Sieves)	Percent by Weight
Passing ¾-in.	100
Passing ½-in.	80-90
Passing ⅓-in.	70-80
Passing No. 4	52-62
Passing No. 10	30-50
Passing No. 40	20-30
Passing No. 80	10-15
Passing No. 200	4-8

Bitumen and liquifier approximated 100-160 lb. per ton of aggregate with an allowable variation of one-half of one per cent on the bitumen and 10 per cent on any size screen of the aggregate. Allowable liquifier is varied according to temperature of day and length of haul. In this case none was used because the materials were still warm on account of the short haul. Up to 1 per cent of hydrated lime was added.

The aggregate was heated to about 130 degrees F. to dry same before cement and liquifier were added. Not more than 1 per cent moisture was allowed in the aggregate. A standard hot-mix plant was used so that all ingredients could be accurately controlled. The mixture



Fig. 9—Closeup of Concrete Pipe Showing Openings Left for Subdrainage. These Joint Openings Are Covered With Zinc-Coated ¼ in. Mesh Prior to Backfilling With Gravel.



Fig. 10—A Lorain 1 1/4 yd. Diesel Power Shovel and a Bay City 30 half-yard Unit Dig the Clay-Gravel Base Course Material From the Borrow Pit.

was then dumped into trucks, hauled to the apron and dumped into one of two Adnun black top pavers, spread and rolled. The entire 300 ft. width was laid to grade in 10 ft. strips.

Contracts have been awarded to C. C. Moore Construction Company of Panama City, Florida, for the grading, base course, and surfacing of the remaining runways. There are two 300-acre auxiliary fields, one 8 miles distant and the other 28 miles away which are being constructed as a part of this project.

Personnel

General engineering supervision, planning and direction has been under the Mobile District of the U. S. Engineers Office since January 9, 1941. Prior to that date it was supervised by the Constructing Quartermaster of the South Eastern Air Corps Training Center, at Maxwell Field, Montgomery, Alabama. Col. L. D. Worsham, Corps of Engineers, is District Engineer at Mobile and Lt. Col. Geo. S. Deaderick, Q.M.C., is Constructing Quartermaster of the S.E.A.C.T.C.

Field engineering, supervision, planning, and direction has been the responsibility of Herman Orr, Capt., Engr. Res., who was formerly a road and bridge engineer for the Alabama State Highway Department. He is assisted on the grounds by three reserve lieutenants,



Fig. 11—Capt. Herman Orr, Eng. Res., Left, and Mr. Du Bose, General Superintendent for Hooper Construction Company, Right, in Front of Capt. Orr's Office.

all also former Alabama Highway Department engineers, 1st. Lt. H. L. Fuller, 1st Lt. L. E. Mullins and 2nd Lt. Jarvis Brown.

Mr. R. O. Geisler was general superintendent for the W.P.A. Mr. R. E. DuBose is general superintendent for Hooper Construction Company. C. C. Moore Construction Company has not started work yet. Mr. Alton Futch was general superintendent for Vandigriff.

Civil Engineers To Meet in Fort Worth

The Fall Meeting of the Texas Section, American Society of Civil Engineers will be held in Fort Worth, Texas, October 31 and November 1, 1941.

FEDERAL AID FUNDS FOR 5,810' MILES APPROVED IN PAST YEAR

Use of regular Federal aid funds for construction of 4,262 miles of defense highway and for engineering work on an additional 1,548 miles has been approved in the past year.

The regular Federal aid funds apportioned to the States each year are available only for designated Federal aid systems. The State highway departments have cooperated wholeheartedly in applying these funds together with matching amounts of State funds to defense highways wherever possible.

Access roads to defense areas that are also on the Federal aid secondary system are being improved, and portions of the Federal aid system on the strategic system approved by the Secretary of War are being given priority over other work.

The 4,262 miles of construction to be financed by Federal-State funds and the 1,548 miles of surveys or engineering supervision of construction for work to be carried out with other than Federal and highway funds is to cost \$176,000,000 of which \$98,000,000 is Federal aid. The mileage is classified as follows:

	Miles
Strategic network	4,340
Access roads to—	
Army posts	910
Naval establishments	250
Industrial production areas	100
Reservation roads	200
Hawaii defense	10

The program includes 896 structures, four-fifths of them being bridges and the remaining fifth being grade separation structures at railroads or other highways. Work on an additional 2,010 miles, including 106 structures, to cost \$80,000,000, has been programmed.

Although least in mileage because of limitation of law, access roads to army posts, naval establishments, and industrial production areas are the most important and the most urgently needed to speed the defense program, it was pointed out.

In many cases defense activities have swelled traffic volumes far beyond highway capacities. For example, establishment of powder and bag-loading plants at Charlestown, Indiana, increased traffic on State Route 62 from 700 to 14,000 vehicles per day, necessitating highway construction costing \$579,000. Four miles of road costing \$408,000 had to be built to provide suitable access to Camp Edwards in Massachusetts where the existing route, State Route 28, had become so congested during certain periods that traffic was delayed for hours.

Defense activities in industrial Detroit have overtaxed existing streets, and \$1,200,000 is now being spent to make a depressed, divided express route along a half-mile section of Michigan Avenue, (U. S. 112).



A Rotary Plow Cleaning Up a Windrow on the Shoulder of a Road

SNOW BLOCKADE INSURANCE

Explaining How Iowa Gets Protection From Snow Drifts and Traffic Tie-ups

By W. H. ROOT

Maintenance Engineer

Iowa State Highway Commission

WOULD your state be willing to pay \$17,000 per year to insure itself against any tie-ups of traffic by snow drifts? Well, that is about what the Iowa State Highway Commission is doing, and we feel that except for temporary delays the insurance pays almost 100 per cent. Naturally, if your state is larger than Iowa, or if it is located farther north, your insurance rate would probably be a little higher, and conversely, if your state is south of Iowa you can get adequate protection for less money.

But who writes this type of insurance, you ask. Well, as you probably have suspected, we don't actually buy an insurance policy from any one. We write our own insurance and here is how we do it. We have stationed at strategic points over the state twenty heavy-duty rotary snow plows. These plows insure us that we will not have any lengthy interruptions of traffic due to snow on the highways. We pay our Property & Equipment Division \$17,000 per year depreciation on these plows. This depreciation must be paid regardless of how much or how little the plows are used. As a matter of fact, the snow-fall in Iowa during the winters of 1937-38 and 1938-39 was very light and most of our rotary plows were not taken out of the garages during these winters. Nevertheless, it is vitally important that we have these plows, that we have them

located at strategic points, and that we have them ready to go on a moment's notice. Just as your wife does not care to collect on your life insurance, so we don't care to collect on our snow insurance. We are perfectly willing to pay the annual depreciation and leave the plows in the garages.

Our snows usually start with the wind in the east; too often in the southeast which usually means a wet snow often preceded by rain. As soon as it starts snowing we send out our light, straight-blade snow-plows and truck underbody ice blades in an effort to keep the snow from packing and forming ice. Sometimes we are successful and sometimes we aren't. But that is another story. What we want to talk about now is heavy snow storms and drifts that actually block traffic.

As our storms progress across the state, usually from the southwest to the northeast, the wind ordinarily swings around to the northwest. At times it continues to snow several hours after this wind shift, but we know that when the wind changes from the east to the northwest the storm center has passed and that we will probably not get a great deal more snow. (Of course, the weather man sometimes fools us and we get a real blizzard out of the northwest.) The chief danger from these northwest winds, however, is not additional snow

but the re-arrangement of the snow we already have. In Iowa the natural order of events is for the snow to fall peacefully and uniformly over the landscape, "A Magic Mantle of White," as the poets aver. The "old northwest wind" comes along, picks it up, sweeps the fields bare, and piles it into high drifts on the highways. There are, of course, scientific reasons for this phenomenon, but some of our friends in other departments claim that it is because the Maintenance Department "hasn't lived right." At any rate, after a few hours we find that this "beautiful mantle of snow," which has been mixed with considerable good Iowa loam and dumped on the highways, is to say the least, a real nuisance to those who want to go from here to there or vice versa.

All this time the Maintenance Department has not been entirely unmindful of what was going on. In fact radio reports are issued every few hours telling the public how we are battling the "worst storm in years" and that all state roads will be open "in a few hours." When the going gets too tough for our light straight blade plows the heavy duty straight blade plows mounted on four to five-ton trucks are called into action. But this is a real storm I am talking about and we soon find the straight-blade plows inadequate, so the heavy-duty trucks are called in and the straight blade plows are replaced with the heavy duty "V" plows. These big trucks with "V" plows will go through most any drift, particularly if there isn't too much old snow from previous storms piled up on the roadside. I said, "most any drift." Occasionally, however, we encounter drifts which the "V" plows can't negotiate. If it were not for the insurance mentioned earlier in this article traffic would have to stop, or at least it would be blocked until an opening could be made by hand shovelers (a very slow and expensive operation) or until the snow melted in the spring.

But thanks to our twenty rotaries we do not need to be blocked for long. In fact we bring the rotaries into action as soon as the going gets tough for the big "V's". We don't wait for them actually to stall. We work a



There Is a Limit to the Depth of Snow a Truck and V-plow Can Handle—as Was Found Here. A Rotary Plow Must Now Be Called Into Action

rotary and "V" plow together in this manner—the "V" plow goes ahead and opens a path for one way traffic. As long as the "V" can keep moving it can open a path faster than the rotary. When the "V" reaches a drift which it cannot break through it is backed out and the rotary pulls ahead and literally drills through the drift throwing the snow clear out of the right-of-way. The rotary then drops back and lets the "V" go on ahead. As the rotary follows along behind the "V" the operator uses it to widen the cuts but he always keeps the "V" outfit in view so he will be ready to help them without delay when they get into a tough spot.

This opening up for one way traffic is a 24-hour a day job until all state roads are open. Then comes the widening. This is done by the heavy duty trucks equipped with "V" plows and 10 foot wings. We prefer to have these wings attached to the truck in front of the cab and entirely independent of the "V". For the final push back, the "V" is dropped from the truck and the wing is used alone. These outfits can really push the snow back from the pavement a considerable dis-



Scene Near Manchester, Iowa. Traffic Waits (Or Should We Say Pauses?) While a Rotary Plow Opens the Road



Trucks and V-plows Can Handle Many Heavy Drifts Without Help As This Outfit Has Done

tance, but after a series of storms we find the snow is piled so high on the roadside that the trucks and wings can push it no further. Here again our rotary insurance is effective. The rotaries pick this snow off the shoulders and hurl it into the adjacent fields. Special blades and sometimes hand labor are used to break the drifts down and move the snow into the rotary.

This process of widening the snow cuts by pushing the snow back with wings or blowing it off with rotaries is often greatly hampered by soft shoulders. About 90 per cent of the road shoulders in Iowa are maintained as earth without surfacing. Many of our snows, particularly in the south half of the state, start as rains so the shoulders become saturated before the snow falls. These soft shoulders furnish little traction for the trucks and the plows often bog down or slide into the road ditch. The clearing work is therefore greatly delayed and the cost of the work is increased. When the rotaries and other plows have cleaned the drifts and snow piles from the road, from shoulder to shoulder, we are all set for the next storm. A road thus cleaned out will not drift during subsequent storms as badly as one where the snow cuts are narrow. Also a road cleaned out in this manner can, after the next storm, be plowed much more successfully than one with narrow cuts. You have a place to put new snow.

The insurance rate on a fireproof or fire-resistant building is less than on one built of inflammable material. We are able to reduce our rotary insurance by

making our roads drift proof or drift resistant. This is done by erecting snow fence. Each year we erect 8½ million feet of fence and the annual depreciation on this fence is about \$30,000.00. It costs about two cents per foot to erect and take down this fence each year. This amounts to \$170,000.00 for the state, which added to the \$30,000.00 depreciation makes our drift resistance work cost roughly \$200,000.00 per year. If it were not for this snow fence it would be necessary for us to have at least five times as many rotary plows as we now have, and even then I am sure there would be long periods when our roads would be impassable.

So by making our roads drift-resistant by erecting snow fence at an annual cost of about \$200,000.00 we are able, with our rotary plows, to practically insure the public that all state roads will be open for traffic within 24 hours after any storm. This insurance costs us about \$17,000.00 per year and we think it is worth it.

BOOK REVIEW

A revised edition of Municipal Public Works Administration has just been published. It is a complete revision of the first edition which was published first in August 1935. The book is one of the special texts prepared for the series of ten correspondence courses covering the various fields of municipal administration offered by the International City Managers Association through The Institute for Training in Municipal Administration, Chicago, Illinois. Heretofore the books could be obtained only through enrollment in the courses. However, they now may be purchased separately at \$7.50 each.

The book on Municipal Public Works Administration opens with a chapter on public works as a municipal function after which comes chapters under the following headings: Street Improvement and Maintenance, Street Cleaning and Snow Removal, Street Lighting, Refuse Collection and Disposal, Construction by Contract, Equipment Management, Organization, Personnel Management, Planning Public Works, Measurements Records and Administrative Reports, and Public Relations. Into the volume on Public Works Administration has gone the best thought and judgment of successful administrators, outstanding technical men, and leading students of municipal problems. As the name implies, it is the administrative aspects which are covered.



A Rotary Plow Cutting Through a Heavy Drift

CONTRACTOR DOGGEDLY DIGS IN RAIN DAY AFTER DAY

*Calendar Day Contract Causes
Concentration of Equipment*

CAMP POLK, about 5 miles southeast of Leesville, La., is about to get another concrete access road. This camp is the home station of the 3rd Armored Division and is expected to house some 18,000 men. A new access road has already been built to the camp from the west, connecting with U.S. 171 a few miles south of Leesville. The new road strikes northward out of the camp, intersects La. 21 a few miles east of Leesville and is projected northward to intersect U. S. 171 a few miles north of Leesville. Present construction comprises the stretch from La. 21 to the camp, a distance of 5.7 mi.

The big feature of this project is the dogged determination of the contractor to move dirt regardless of weather conditions. He worked against a calendar day contract, something which the military authorities desired but also, something that has tremendously raised his costs.

Design

To give an idea of the type of grading section being built, figures 4a and 4b are presented. As soon as the grading is completed the paving slab will be let to contract. The proposed paving, without alternate, is a 9-6-6-9 in. reinforced concrete slab of two 11 ft. lanes.

Except for a section of about 2½ miles, where selective thinning of trees and shrubs was done by the resident engineer, the project is being cleared for the



Fig. 2.—Tractor Scraper Outfit Stuck on the Shoulder of the Dump in the Soft, Wet, Sticky Clay Being Hauled. Much Lost Time Was Experienced From This Cause. Ruts Formed Twelve to Fifteen Inches Deep in the Rubbery Clay



Fig. 1.—Footing Was So Soft and Slippery From the Rains That Tractors Had to Double-Header to Load

full minimum 200 ft. width of right-of-way, sometimes as much as 300 ft.

Louisiana State Highway Department standard design is being built into the road. Soil samples were taken at 500 ft. intervals, and grading conditions now encountered clearly indicate the spacing was too great.

Some of the soil tests indicated the soil to be Group A-7 yet there is no special treatment designed for the

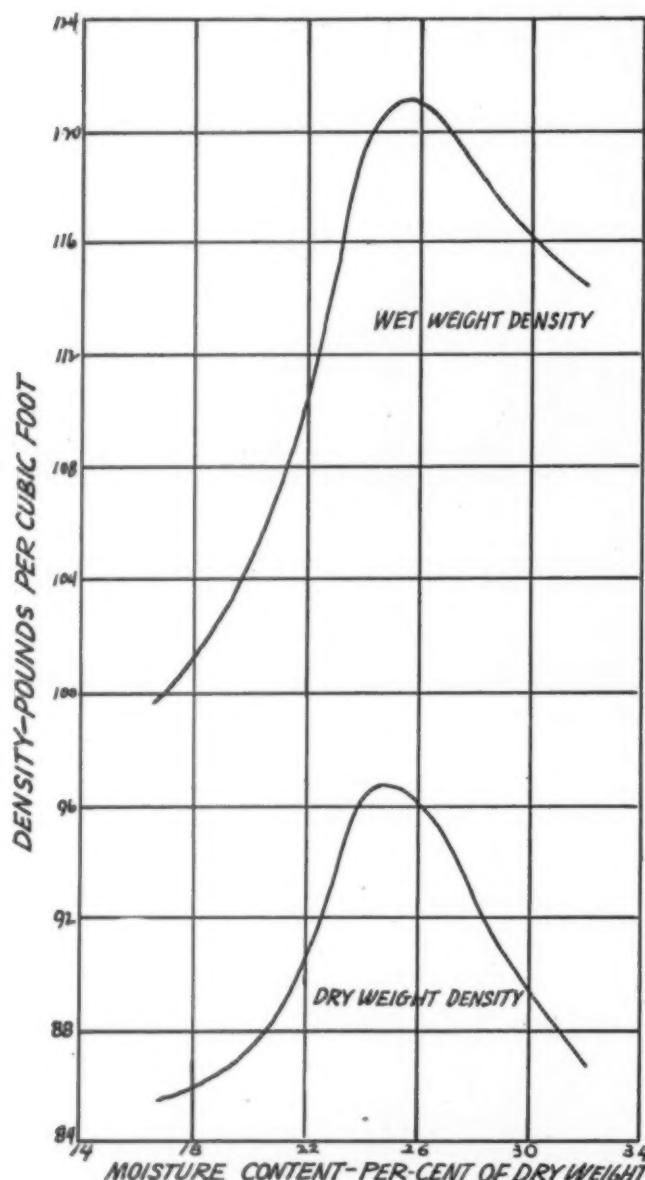


Fig. 3.—Soil Compaction Curve for Sta. 100 to Sta. 284

embankments or on the top of the subgrade before the concrete slab is placed.

The curves shown by figure 3 are the compaction curves for the soil of the following analysis:

CAMP POLK ACCESS ROAD, STA. 279+5 TO 107+0

Mechanical Analysis

Coarse sand, per cent.....	1
Fine Sand, per cent.....	25
Silt, per cent.....	42
Clay and Colloids, per cent.....	32
Colloids, per cent.....	8
Passing 40 Sieve, per cent.....	99

Physical Characteristics

Liquid Limit	54
Plastic Limit	24
Plastic Index	30
Shrinkage Limit	11
Shrinkage Ratio	1.93
F. M. Equivalent.....	33
C. M. Equivalent.....	36

Classification. Soil Group A-7. Light Silty Clay.

Construction

Figure 2 is a picture of the trouble the contractor got into trying to continue construction in this or a worse clay. It was necessary, in these cuts, to double-header on a scraper to load, as shown by figure 1, and at times to use the bulldozer as a pusher.

Construction started by clearing and grubbing a width estimated to contain the slope stakes. Plans were not ready when clearing and grubbing started on May 15.

The chart, figure 5, was made from the engineer's remarks in his diary of the 60 calendar days allowed for construction. Many of the days classified as "good" were such only because the contractor was allowed to dig wherever soil could be dug. As shown by the tabulation of estimated quantities, there are 242,421 cu. yds. of common excavation involved, with 340,899 sta.yds. of haul. On the basis of 60 calendar days, that indicated that the contractor had to move about 5,000 cu. yds. per day to complete the job and have enough time to spare to put on the finishing touches.

Consequently, whether rain fell or not, earth had to be moved and the equipment was transferred to some other part of the job where it could manipulate even if each unit had to be double-headed. Within a week after the rain started, the job was torn open for the whole length.

Speed being the essence of this contract, it was necessary to truck in all materials. Being a national defense project, the state furnished *all* materials. There were several concrete pipe culverts and some large diameter asphalt coated corrugated metal pipe culverts, besides one trestle bridge.

The bridge has a peculiar design. It is a typical wood trestle structure 5 spans at 19 ft. ctrs., of creosoted timbers, floor, and piling. However, on top of

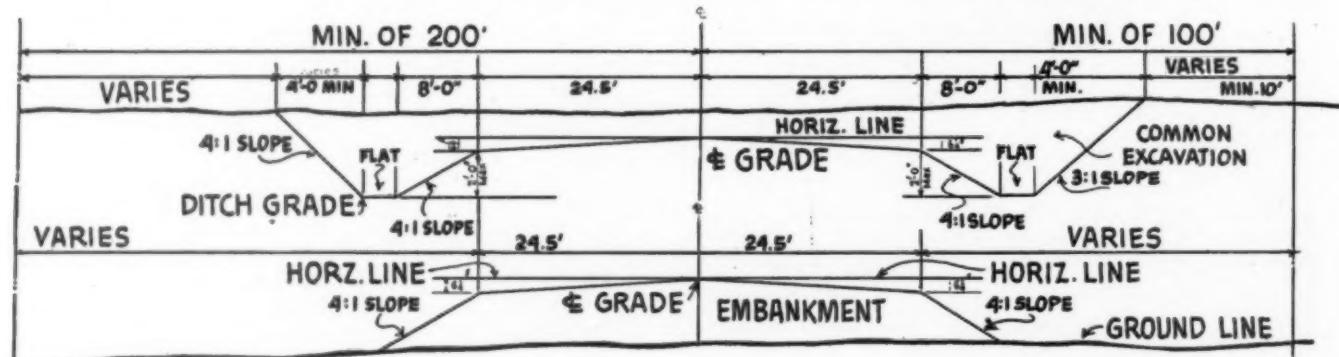
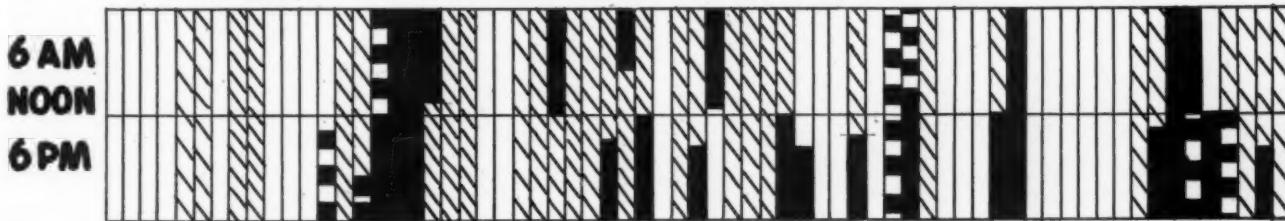


Fig. 4a.—Typical Grading Sections. Note There Is No Provision for Placement of Selected Substructure Material

WEATHER CONDITIONS

CLEAR CLOUDY SHOWERS RAIN



WORKING CONDITIONS



MANY DAYS CLASSIFIED AS "GOOD" ONLY BECAUSE EQUIPMENT COULD BE MOVED TO A GOOD CUT

Fig. 5.—Weather and Working Condition Chart Indicates Little "Good" Grading Conditions

the wood floor a concrete slab is to be poured. This slab is $3\frac{1}{8}$ in. thick on the edge and 5 in. thick at the center. It will have a longitudinal center joint and transverse joints at 4 ft. 9 in. intervals, as shown by figure 6.

Equipment

The job was run 24 hours a day. In an attempt to complete it within the contract calendar days, W. R. Aldrich & Company used the following equipment:

- 2—D7 Caterpillar tractors and 9 yd. Le Tourneau scrapers.
- 2—D8 Caterpillar tractors towing 12 yd. Le Tourneau scrapers.
- 1—D8 Caterpillar towing a 15 yd. Le Tourneau scraper.
- 1—D8 Caterpillar tractor towing a 12 yd. Adams scraper.
- 2—D6 Caterpillar tractors with Le Tourneau bulldozers.
- 1—D4 Caterpillar tractor with Le Tourneau bulldozer.
- 1—75 Caterpillar tractor with Le Tourneau bulldozer.
- 3—TD18 International tractors with Bucyrus-Erie bulldozers.
- 1—90 Cletrac with Baker bulldozer.
- 1—TD18 International tractor with Bucyrus-Erie 10 yd. scraper.

- 1—Allis-Chalmers K tractor with Baker bulldozer.
- 1—12 ft. Caterpillar motorgrader.
- 1—12 ft. Galion motorgrader.
- 2—Sheepsfoot rollers.
- 1—Koehring 303 dragline.
- 6—Ford dump trucks.
- 1—Pile driver.
- 6—Kohler light plants.
- 1—Northwest dragline No. 6.
- 1—Hobart arc welder.
- 1—Adams 12 ft. blade grader.
- 1—TD18 International tractor and double tandem sheepsfoot roller.

The equipment was used in more than one gang. The Northwest dragline and trucks worked together with a D-7 Caterpillar tractor and bulldozer, a 12-ft. Galion motorgrader, and a TD18 International tractor with double sheepsfoot roller unit.

The clearing gang started out with 4 bulldozer units (sometimes more) but settled down to a TD18 Inter-

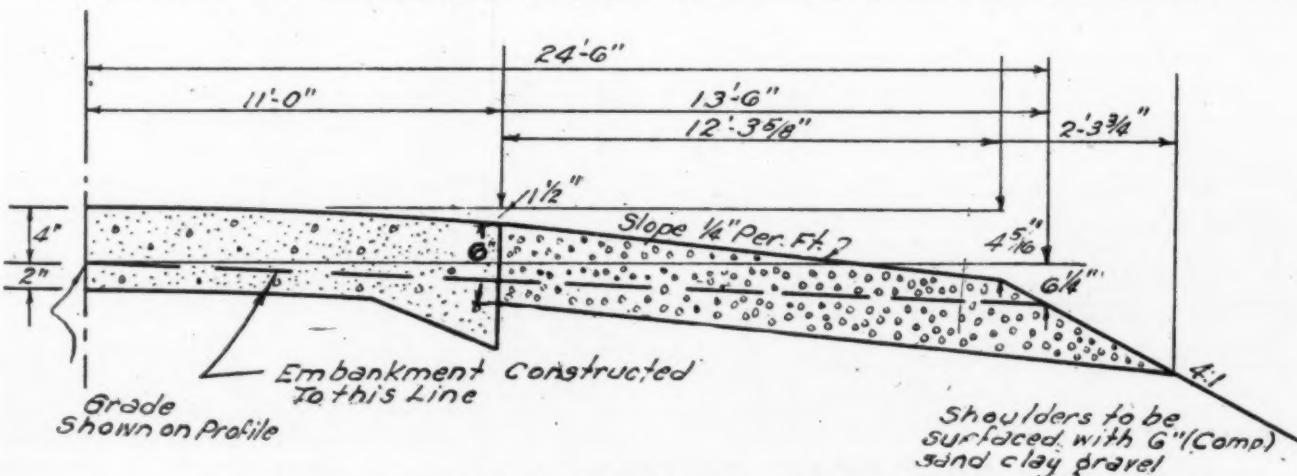


Fig. 4b.—Typical Half Section. Shoulders Are Compacted Sand-Clay Gravel



Fig. 7.—Caterpillar D8 and Le Tourneau Bulldozer on Heavy Clearing Work

national tractor with Bucyrus-Erie bulldozer, a Cletrac with Baker bulldozer, and a D8 Caterpillar with a Le-Tourneau bulldozer. Figure 7 shows the latter on some of the heavy 300 ft. right-of-way clearing.

The pipe laying outfit was a Koehring crane with an AC tractor and bulldozer.

The scraper excavating crew consisted, most of the time, of 6 tractor-scraper outfits, 2 bulldozers, one sheepfoot roller, a Caterpillar 12 ft. motorgrader, and 4 light plants.

The bridge crew had only a pile driver. Figure 9 is a view during construction.

During most of the "poor," and "too wet," rainy weather it was impossible to use the sheepfoot rollers. In one of the cuts near the south end of the project the rubbery clay, when dumped on the embankment, flattened out under the passing treads and wheels. As the loaded (or unloaded) scrapers passed, the embankment would deflect half an inch and return as the wheels moved along.

No field tests of consolidation were made, the sheepfoot rollers operated continuously when the grading outfits worked and only when they could roll without clogging with mud.

Personnel

The contractor on the job is W. R. Aldrich and Company, Baton Rouge, La. His superintendent is Mr. L. A. Holland.

For the state, Mr. Harry B. Henderlite is chief engineer. The resident engineer in direct charge is Mr. E. R. Woodman, under the supervision of Mr. J. E. Coyne, District Engineer.

The contractor and his personnel deserve commendation for the determined effort made to complete the project within the contract calendar day period. Even though they never quite finished, they did extremely well in the face of the continued rainy weather, at a cost, undoubtedly, in excess of the bid price.

The engineers gave complete, whole-hearted cooperation to push this national defense access road to a rapid completion.

Bid Prices

To get the job Aldrich submitted the following bid prices, estimated quantities were prepared by the state highway department:

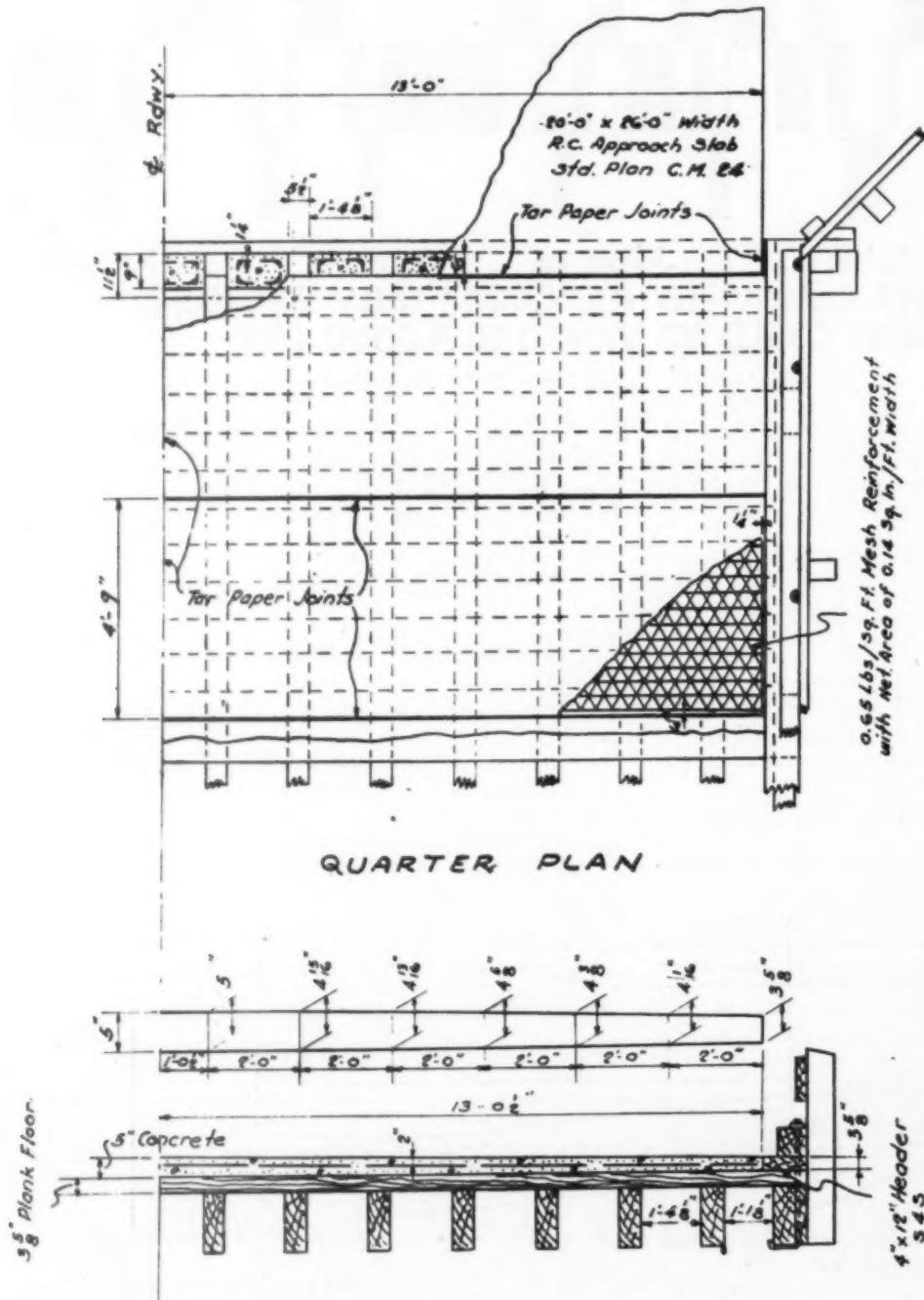


Fig. 6.—Section Views of Bridge Floor on Trestle Spans



Fig. 8.—Placing U. S. Steel 72 In. Asphalt Coated Corrugated Metal Pipe; Fitting Sections Together

Item	Unit	Est. Quantity	Price
Clearing	Acre	199,609	\$50.00
Grubbing	Acre	120,000	60.00
Common excavation	Cu. Yd.	242,421	.26
Drainage excavation	Cu. Yd.	7,500	.35
Overhaul on excavation	Sta. Yd.	340,899	.005
24 in. R. conc. pipe.....	Lin. Ft.	873	1.50
30 in. R. conc. pipe.....	Lin. Ft.	694	1.75
36 in. R. conc. pipe.....	Lin. Ft.	462	2.00
48 in. Corr. m. pipe, coated.....	Lin. Ft.	136	---
60 in. Corr. m. pipe, coated.....	Lin. Ft.	297	---
72 in. Corr. m. pipe, coated.....	Lin. Ft.	200	---
72 in. Corr. m. pipe, coated.....	Lin. Ft.	240	---
Selected clearing	Acre	23,806	50.00
New comb. mesh and B. W. fence.....	Sta.	73,174	4.00
Single swing driveway gate.....	Gate	15	6.00
Transplanting fruit trees	Tree	8	3.00

Installation of asphalt coated corrugated metal pipe is done by force account, as is the erection of the timber trestle.

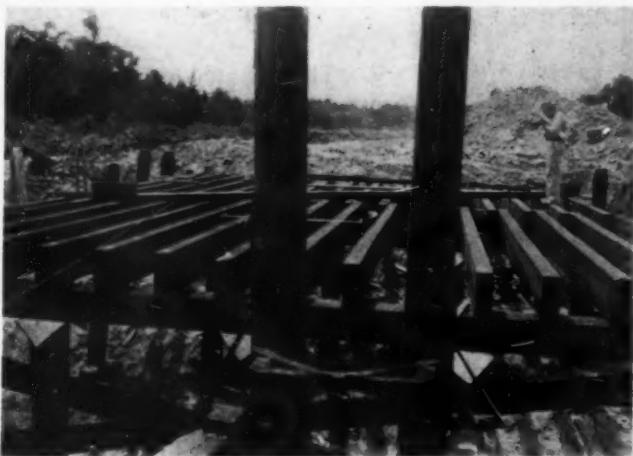


Fig. 9.—Trestle Span Under Construction Looking Through Pile Driven Leads

ROADS IN FRANCE AND ENGLAND IN WAR TIME

Some interesting points on war time highway transport in England and France were brought out by Thos. H. MacDonald, Commissioner of Public Roads, in a paper presented May 15 at the Eastern Conference of Motor Vehicle Administrators.

Military observers returning to this country after the occupation of the Low Countries brought vivid descriptions of the complete stagnation of traffic, particularly on the roads in France. Here the roads became so completely clogged with refugee traffic that the movement of military vehicles was impossible. Almost within a matter of hours after the invading Army appeared, the roads had been cleared and the Panzer divisions were moving through unhindered. It is understood that the German High Command made no effort to restore rail communications demolished by the retreating armies, but relied entirely upon motor transport to move and to supply the armies. The failure of the French and the efficiency of the Germans in planning and organizing highway traffic may not have spelled the difference between defeat and victory, but that traffic organization was of extreme significance cannot be denied.

In England we are able to draw from a different experience, which perhaps more nearly corresponds to our present problem. There, enemy action has been confined to air attacks, and the problem of highway transportation has thus far not been complicated by an actual invasion. Prior to the war it had been the policy to discourage by taxation the use of heavy motor lorries, and no strategic network was laid out, the possibility of invasion having been heavily discounted. Consequently highway transportation failed drastically to measure up to war-time needs. Now, however, there has been established a red and a blue network of defense highways and plans have been developed by the highway police and military authorities under which the use of the roads is specifically limited to "essential" traffic in certain emergencies.

CORRECTION

On page 34 of the August issue the picture below was published with an incorrect caption. Herewith the caption is correct. The hauling units are Koehring Trail Dump wagons instead of Euclid as published.

The last paragraph on page 33 of this issue referred to these outfits as Euclid bottom dump trailers whereas they are Koehring Trail Dump units—Editor.



Contractor Cook's Koehring Crane With Special Dragline Bucket Loads 12 Yds. on to 10 Yd. Koehring Trail Dump Buggies

OBSERVATIONS BY THE WAY

By
A. PUDDLE JUMPER



For drilling to test bridge foundations, Texas built several drill rigs like the one shown here.

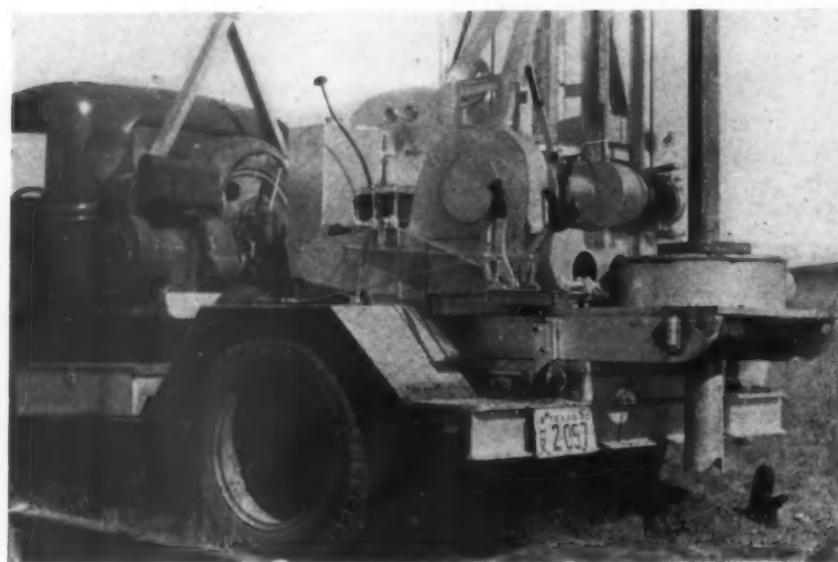
The first picture shows the drill rig set up on location getting ready to erect mast to start drilling. The outfit is all-wheel drive.

The upper right picture shows the

dual front tires. The rear wheels are the same.

The picture below shows the drill rig set up on solid ground ready to start drilling.

The fourth picture is the last one of the drill rig. It shows the operator removing a core from the sampler.



The last picture of this series shows a utility tool which works with the drill rigs. It is called a swamp



buggy. View taken in the swamp west of Wallerville, Tex. The outfit is all-wheel drive.

Q Attention A.P.J.

Dear Sirs:

Travelers on US 50 east of Lakin, Kearney County, Kansas, have encountered several miles of peculiarly striped bituminous surface.

These strips are small ridges, one inch wide, one-fourth inch high, spaced approximately three inches apart, and are produced by dribbling MC-1 from a distributor spray bar with no pressure except the hydraulic head, the asphalt being immediately covered with a light application of sand.

The purpose of the ridges is to skid-proof sections of surface treated mat which become slick due to the respective conditions of cold weather when sealed, hot weather causing bleeding, followed by dust conditions which left a slippery-when-wet



surface. The treatment is regarded as temporary until further full surface treatment can be secured.

The skid-proofing shown was placed in October, 1940, and had been in service over nine months when the picture was taken.

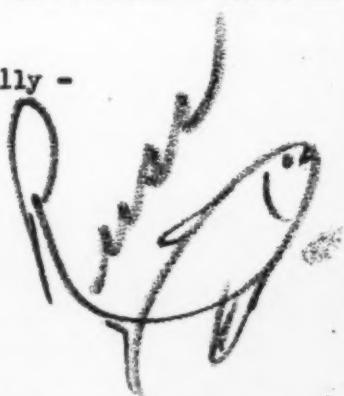
The cost of this treatment is very low and is quite effective. A fourteen-foot bar was used on the distributor, with one pass taken from the center of the road. If too large a quantity of asphalt is used, the ridges become too high and objectional swaying of the car is noticeable, though not occurring with small ridges of less than five-sixteenths to one-fourth inch in height.

This method of treatment is the brain child of Mr. George Tiffany, Division Engineer, Kansas Highway Commission, Garden City, Kansas.

Very truly yours,
J. R. BENSON,
Bituminous Engineer.

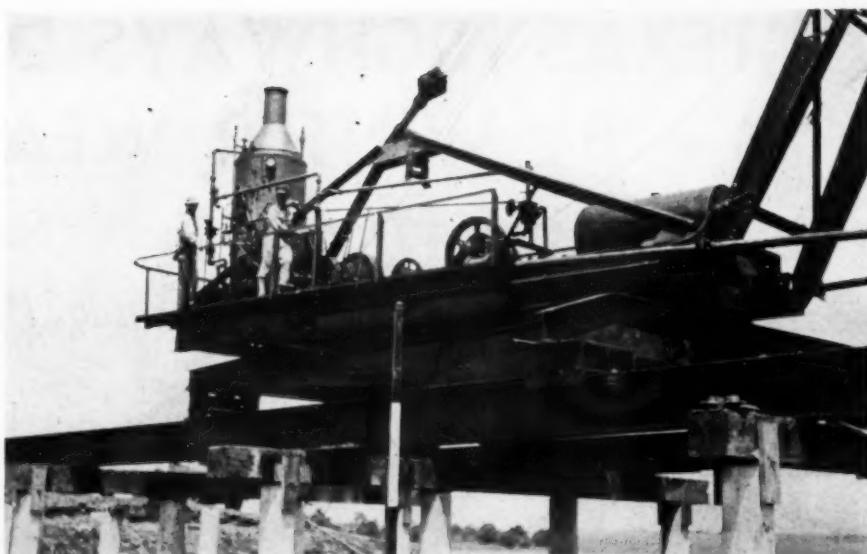
• • •
Q Speaking of signatures, the one shown herewith is different from any other I have ever seen. I don't think

Cordially -



"Russ" Williams was tight when he signed the letter, either.

• • •
Q "Only low talk permitted here"
—Sign in a library.



Q Full revolving pile driver owned by Oran Speer, Alvord, Texas, moves on 24 in. I-beams. The fuel tank may be moved to rear when ballast is

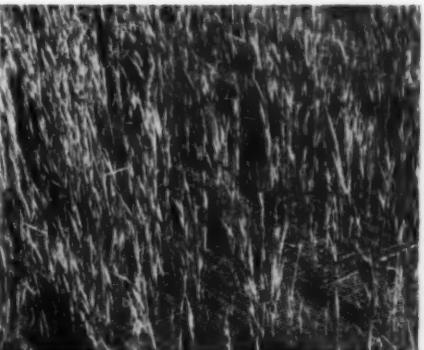
needed. This outfit soon will start work (probably has by now) on grade separation near Dallas, Tex.

Q Editor

Dear Sir:

In your July edition of ROADS AND STREETS there is an account of "Cheese cloth being used on the back slopes in Kentucky." It was not cheese cloth that your "Puddle Jumper" saw but paper netting.

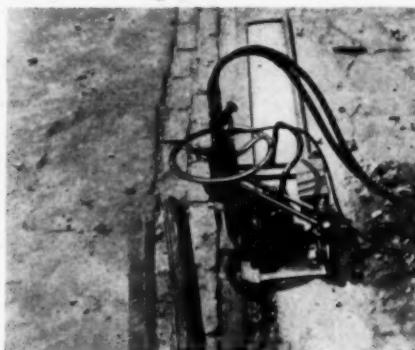
Where sod is not obtainable the back slopes are harrowed, fertilized and seeded, then covered with straw mulch. The straw is held in place by paper netting wired down every three feet. The paper netting is about a quarter of an inch mesh and treated to prevent rotting.



I am sending two photographs, one showing the netting that has just been laid, and one of the grass growing through the netting.

Very truly yours,
B. F. BUCKNER,
Engineer of Roadside Improvement.

Q Thousands of tons of scrap rail for defense steel demands can be obtained by the removal of abandoned streetcar tracks which are now embedded, unused, in the streets of hundreds of cities throughout the country. A portable, oxy-acetylene cutting machine, operating on a special track, can be used to cut away abandoned streetcar rail. A cut section of the rail is shown in the left



foreground. This partially cut standard straight rail indicates how a single cut severs the entire rail top from the web. The torch will also cut the rail to charging-box size.



TEXAS HIGHWAYS DAMAGED BY WINTER WEATHER

*Freezing, Thawing and Heavy Snow
Produces Maintenance Problem*

THAT Texas might have a snow removal problem some would think fantastic. Yet a freeze that continued for nearly three weeks, over certain portions of the state, accompanied by blizzards and sporadic snowfalls caused heavy damage to many sections of road in the state. This condition, however, comes as a surprise more than as a problem, annually. When the snow does come, though, *it is a problem*.

The last big freeze wrecked spots and patches of many surfaced roads. District engineers cooperating with headquarters engineers surveyed the damages and in most cases found that failures were due to water seeping into the base course, and, by alternate freezing and thawing, cause edge or surface failure. It has been stated that there are more alternate cycles of freezing and thawing

in the Panhandle of Texas than in any other section of the country. This is the area where most damage occurred.

Damages

One district engineer reported as follows about the damaged roads in his district:

"There is hardly any way to define any definite damage pattern that resulted from the heavy freeze. It seems apparent that the asphalt was subjected to such low temperatures that it cracked. Also, upon investigation, we found that the shoulders and even the soils in the ditches and adjacent fields were badly cracked. In places the cracks are a quarter to three-quarters of an inch wide and very thickly scattered along adjacent to the highway rights-of-way and inside the highway rights-of-way. It may be that some of these cracks in the surfaces have come through from the subgrades. They are due to the dryness of the soil as well as the extremely low temperatures to which the soils have been subjected."

"There are some places where the soil was frozen to a depth of two feet, and other places where it was frozen to a depth of only eight inches. It would be difficult to determine definitely if the cracks come from underneath the pavement or through the base and then through the asphalt surfacing. But we do know that in these cases where the surfaces have ravelled, that in most instances some of the asphalt is still adhering to the gravel that is ravelled off. It is our thought that there might have been a slight moisture in the surface that froze and cracked the aggregate from the surface itself."

"It is apparent that most of the edge failures were caused from frost damage starting underneath the base or underneath the surface. But we had all of our Maintenance Foremen and their crews instructed to push all snow to a minimum distance of three feet from the edge of all surfaces. In most instances, this was accomplished,

With Wheels Spinning on the Ice a 1½-Ton Truck Shows Lack of Weight and Power Necessary to Move an 18-inch Snow Onto the Shoulders of U. S. 60 North of Amarillo. Here Only Five Plows Were Available Where Fifteen Were Needed



High Winds Drifted Roadway Full Again After First Clearing Bladed a 31 Foot Windrow on U. S. 83



To Try to Get Roads Cleared Small Patrol Graders Were Put to Work. This View Shows Inadequacy of Equipment for Job



After Being Closed From Friday to Sunday Afternoon, U.S. 66 Could Be Opened Only to One-Way Traffic at Many Points

but in some cases it was impossible because of the thawing and freezing that was going on at the same time the snow was being removed. It was this particular moisture that caused us most of the damage on the edges."

Another district engineer reported his findings on freeze damage as follows:

"In our survey of damages, we now find that the greatest damage was evident in additional cracking of the slab and loosening and disjoining of the joint filler from expansion joints of the pavement. It is noted over the entire district on the concrete pavement that the expansion joints have lost a considerable amount of asphalt, which asphalt is now in a broken, disintegrated condition on the shoulders of the road. We believe this is due to the fact that the contraction of the pavement was so great that the asphalt joint filler became brittle and the traffic passing over it broke it, expelling it from the joints onto the shoulders.

"Our investigation discloses that this condition is prevalent only in the older pavements, while, in the concrete pavements laid within the last few years, we did not find this condition existing, seemingly because the asphalt in these pavements had enough life to withstand the freezes, as compared to that of the older type pavements.

"Damage done to our asphalt pavements is not along the edges but is, in nearly all cases, confined to the surface of the road, the same being classified as open cracks, frost heaves, disintegrated pockets, and broken surfaces and being caused by the freezing, low temperatures. It is noted in one particular instance, on Highway * * *, between * * * and * * *, that on a low fill, say approximately 4 ft. in height, the entire fill with flexible base



Pulling Out Stranded Motorists on U.S. 66. The picture above and at left were taken in the Texas Panhandle



Trying to Move 3 Feet of Snow on Texas 117 in Lipscomb County With Tractor and Blade Grader

and topping had apparently contracted and, after thawing out, the entire center of the pavement split open for a distance of about 100 ft., the crack being entirely through the surface and base and being open from 0 in. to $\frac{5}{8}$ in."

Comments from another district engineer state:

"There does not seem to be any definite pattern with respect to the above damages except that all of them seem to be most serious in the 'wheel tracks.' This observation applies equally to the wheel track near the pavement edge and the one near the center line."

A headquarters engineer from Austin inspected many failures over the state. Following is typical of his reports on these failures:

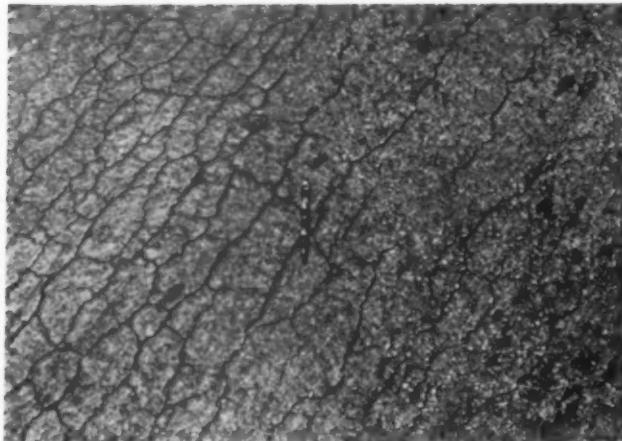
"An inspection of this highway was made January 23



Gunn Hill, State Highway 49, 3 Miles East of Daingerfield, Texas. Showing Snow Blanketed 3 Inches Deep



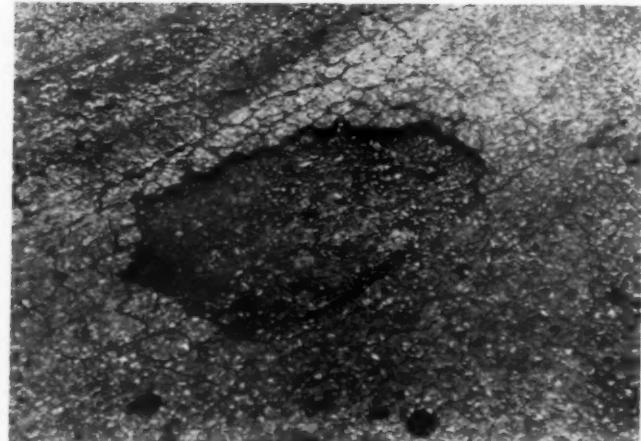
Motor Grader With Long Blade Pressed Into Service on Texas 83. Wind Kept Job Ahead for Many Days



Character of Edge Failures in All Parts of State

in company with * * *, * * *, and * * * to determine the amount of damage caused by recent freezing and thawing action, also satisfactory methods of making repairs. This highway consists of a double bituminous surface treatment on trench type caliche base constructed in 1935.

"Beginning at a point approximately 3 miles west of * * * and extending west to the * * * county line, there were sections of pavement on either side equal to approximately 40 per cent of the entire length which had cracked, ravelled, broken out or otherwise failed. The majority of these failed sections extend from the pavement edge toward the center line for an average of about 3 ft.



After Alligated Surface Comes Spalling and Then a Chug-Hole

"A sample of the caliche base was taken from one of the failed areas which showed a considerable amount of frost. At the time the sample was taken, the temperature was considerably below freezing and had been for several weeks. A laboratory test showed that this sample contained 22 per cent moisture. The shoulders are of sandy material, and moisture quickly penetrates allowing the edges of caliche base to become moist. After several freezing and thawing cycles, base and surface have opened up enough to start edge failures which have extended toward the center line approximately 3 ft. Only one case of failure along a center line was noted.

"In connection with this report, I want to comment on my observation of the three mile experimental shoulder stabilization project on this section of highway. The project began in * * * and extended west three miles. The type of stabilization consisted of road-mixing 3 gallons of SO-1 oil per square yard with the sandy soil shoulders for a depth of 4 in. to 5 in., 5 ft. wide and costing approximately \$1,000.00 per mile. The project has gone through one winter and a portion of this winter which has been a severe test within itself. No edge failures were noted on this section and only 10 or 12 small spots of the surface had cracked or broken out; each of these places being where previous patching or seals had been applied. The shoulders are free from vegetation which has prevented them from being built up by blowing sand and the oil has also prevented erosion by wind and water. The principal advantage noted was the edge of the base had been sealed against moisture which is believed to be the major cause of recent damage to the other section of this highway. It is believed that the state has received its 'money's worth' in this experimental section. It is recommended that more of this type of work be done especially on sandy sections."



Sealing Frost Damaged Pavement by Hand Spraying RC Asphalt and Covering With Chip Stone



From Some Roads the Surfaces Spalled Completely

Equipment

With regard to the equipment available and required, following is a part of a letter from a district engineer to the state highway engineer.

"* * * to date this district has received 24 different snows this winter, but at the same time * * * not all of these 24 different snows necessitated any appreciable amount of work.

"This section of the country was practically covered with snow from December 23 to March 1. In other words, additional snow was falling every now and then, and even though the equipment did get the pavement practically clear one day, it would either be filled up the next by new snow or else drifted into the roadway by the still blocked with snow. In this connection, when the

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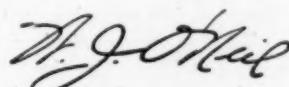
On the broad shoulders of America's great trucking industry lies the responsibility of moving largely increased quantities of materials . . . *efficiently, dependably, safely* and at *lowest cost*. The trucking industry's willingness and ability to do this job is beyond question. It becomes a matter of the availability and the quality of trucks. The need is for trucks that are *built* for the job . . . to *stay* on the job . . . *Job-Rated* trucks!

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defense hauling! They're *good* trucks . . . the *best* we've ever built! Best design, best materials, best workmanship, best quality throughout.

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President, Dodge Division,
Chrysler Corporation

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... no substitute for DODGE DEPENDABILITY*





*Showing Freeze Damage. Surface Condition of Asphalt Pavement.
Gravel Base Thoroughly Saturated*

pavements were cleaned of snow, the equipment would begin working on the shoulders attempting to push this snow on back toward the right-of-way line. After several such snows, the snow was banked on the shoulders and ditch line to such an extent and height that our equipment was unable to push it farther, which entailed getting in behind these banks with cats and blades and working it from that side out toward the right-of-way line. This, in many cases, was impossible to do as the drifts were higher than the fence lines and, in a case like this, nothing could be done about it as the entire right-of-way was full of snow and only the width of the pavement was open to traffic. In case of the big snow, Highway ****, east of ***, was blocked from Friday until late Sunday afternoon, with all available equipment engaged on this one highway, and when it was finally opened to traffic, we had only a one-way traffic lane in many places.

"*** this type of work is terrible on our light equipment ***."

Experience with this season of snow fall has indicated to Texas authorities that they should have heavier snow removal equipment. These reports show the failure that results from alternate freezing and thawing and the necessity for moving snow beyond the ditch line.

To correct the scaled and alligatored surfaces, usually a single bituminous surface treatment was applied. Extensive patching was required, also.

WPA DEVELOPING 278 AIRPORTS

The WPA defense airport program, as the current fiscal year began, employed 71,000 men on 278 sites certified as having military importance.

A summary of the program discloses that projects with an estimated completed value of nearly \$130,000,000 were under way on June 30. The Works Projects Administration and the sponsors had spent \$60,000,000 on these projects, leaving \$70,000,000 worth of work to complete the active program, which is being expedited under priority instructions.

The figures exclude a large number of projects completed within the last fiscal year, recently approved projects on which work had not yet started and work done by the Army and Navy with WPA employees and transferred WPA funds. Some of the airports covered in the summary have additional fields of auxiliary nature where WPA construction is also going on.

At a number of fields in the active WPA program, the Civil Aeronautics Administration has been providing funds for various non-labor expenditures and in some instances specific work by contract. The two

agencies will continue to cooperate under the new airport construction program recently announced by CAA.

The Secretary of War has continued for the new fiscal year his certification of airport sites already designated as of military importance, thus giving them certain priorities in the operation of WPA projects as provided in the Emergency Relief Appropriation acts for this and the past fiscal year.

Blanket certification was extended by the Secretary at the same time to all sites to be developed through WPA projects to Class 3 or Class 4 airports, as defined by the Civil Aeronautics Administration, or capable of such development at a reasonable expense later.

BREAKDOWN OF PROGRAM BY STATES— WPA AIRPORT AND AIRWAY PROJECTS*, ACTIVE AS OF JUNE 30, 1941, AND CERTIFIED BY THE SECRETARY OF WAR OR THE SECRETARY OF THE NAVY AS IMPORTANT TO NATIONAL DEFENSE

	No. of Sites	Estimated Cost ²	Expenditures through June 30, 1941 ³
Alabama	12	\$ 5,743,167	\$ 3,030,666
Arizona	2	1,473,750	267,548
Arkansas	1	887,046	527,060
Northern California	12	3,832,462	1,034,581
Southern California	5	4,553,713	3,412,017
Colorado	4	2,363,513	986,072
Connecticut	7	2,886,434	1,037,607
District of Columbia	4	5,013,999	3,983,770
Florida	31	15,020,478	7,808,043
Georgia	7	2,641,729	1,122,818
Idaho	3	367,106	104,178
Illinois	3	5,624,374	4,439,722
Indiana	4	2,349,531	666,887
Iowa	2	549,694	240,901
Kansas	2	446,589	214,046
Kentucky	1	424,627	412,291
Louisiana	6	2,644,941	1,067,592
Maine	16	7,235,436	1,911,355
Maryland	4	3,749,420	1,698,854
Massachusetts	10	4,560,592	2,276,457
Michigan	7	2,086,401	926,503
Minnesota	4	7,140,303	1,702,297
Mississippi	5	2,520,251	928,025
Missouri	2	941,054	139,470
Montana	6	1,826,558	646,613
Nebraska	2	822,476	367,288
Nevada	2	231,934	122,625
New Hampshire	3	1,194,704	783,936
New Jersey	2	566,437	156,582
New Mexico	5	1,114,634	377,316
New York City	1	534,519	379,247
New York State	8	2,942,102	522,449
North Carolina	8	1,979,999	1,115,325
North Dakota	4	564,797	286,819
Ohio	4	2,189,561	1,579,405
Oklahoma	4	2,828,298	684,808
Oregon	7	1,659,575	459,718
Pennsylvania	6	1,465,315	391,210
Rhode Island	1	552,578	144,759
South Carolina	4	530,492	229,971
South Dakota	4	432,593	120,698
Tennessee	1	149,486	82,018
Texas	15	4,991,784	1,333,535
Utah	3	1,415,504	816,748
Vermont	2	876,117	41,166
Virginia	7	1,257,223	761,115
Washington	12	6,415,789	3,188,396
West Virginia	4	2,413,969	2,061,727
Wisconsin	2	884,778	382,703
Wyoming	2	259,768	115,128
Hawaii	3	1,006,436	282,544
Puerto Rico	2	2,917,551	1,981,887
GRAND TOTAL	278	\$129,081,557	\$59,354,496

*Excludes data on aeronautical survey and airmarking projects and on WPA projects operated by other Federal agencies and financed by allocation of WPA funds. Excludes data for projects completed prior to June 30, 1941.

²Financial data include both WPA and sponsors' funds.



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ROAD AND AIRPORT CONSTRUCTION AT THE JEFFERSON PROVING GROUND

Surface Drainage and Sub-Drainage Given Particular Consideration

By F. L. SPANGLER
Elmhurst, Ill.

THE Jefferson Proving Ground consists of approximately 55,000 acres, located northwest of Madison, Indiana, which were recently acquired for development by the United States War Department. The area is about 19 miles long, measured from north to south, 3 miles wide at its southern edge, and 7 miles wide at its northern edge.

Current work comprises the building or reconstruction of 46 miles of roads, an airport covering an area about a mile square, an emergency landing field, about 14 miles of railroad track inside the boundaries of the grounds, drainage, water supply, and sewerage systems, and such buildings as are necessary in a project of this type and size.

The project is scheduled for completion by August 31. Some of the area is already being used for testing, the first firing for powder testing having taken place on May 10th.

Recovery Road

Of the 46 miles of roads involved in the project, 15 miles will be 18-ft. bituminous macadam roads; a little over 7 miles will be recovery field access roads, 12 to 16 ft. wide, to be of crushed stone; and almost 24 miles will represent reconstructed existing roads, 14 to 16 ft. wide, running from north of the firing line to the recovery field access roads. The bituminous macadam roads will comprise a 2½-in. bituminous retread on top of 9 in. of bituminous stabilized base consisting of

two 4½-in. layers, laid on a compacted subgrade. Bitumen will be applied at the rate of ½ gal. of AES 3 per sq. yd. per in. of thickness. Cross-sections of this road and of the shoulder drains are shown in figure 1.

Airport Runway Design

The site of the airport is rolling farm land. The soil is unglaciated and is clayey in character. The excavation work will entail the moving of about 765,000 cu. yd. of soil, with a maximum cut of about 8 ft.

Grading.—Projects of this kind are a vital part of this country's defense plans. Therefore, every effort is made to avoid delays, even to the extent of starting construction ahead of final plans. This was the case in the building of the airport, excavation and filling having been started before final grade plans were made. Excavation, at this period, was carried down to 6 in. above the anticipated grade, and fills were built up to 6 in. below the probable grade. With the final elevations now definitely known, grades are being brought to final elevations.

In the fill areas under the runway foundations, the Proctor method of controlling moisture content to obtain a compacted subgrade was not used. Much of the work prior to the rains that began falling the last of May was done under conditions of drought that made it impracticable to wet the subgrade fill to obtain the optimum moisture content for maximum compact-

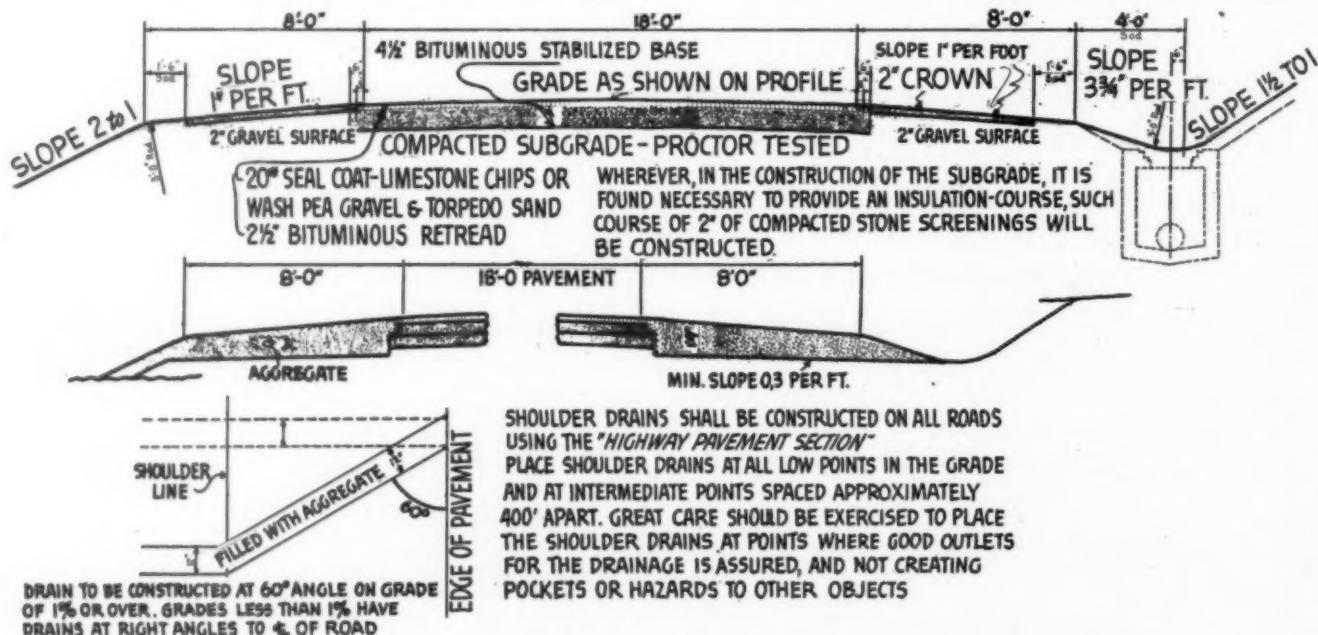


Fig. 1.—Proving Grounds Recovery Road Cross-Sections. It is a 2½-In. Bituminous Retread on a 9-In. Bituminous Stabilized Base. French Shoulder Drains Constructed As Shown

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Fig. 2.—Simmons and O'Connor Use Athey Wagons as Part of the Grading Equipment. Little Sheepfoot Compaction Required

ness. Under such conditions, the fills were made by spreading the material in layers not more than 5 in. deep and rolling each layer thoroughly with 7-ton sheep's-foot rollers before applying the next layer. Compacting was continued until the feet of the sheep's-foot roller would ride on top of the layers without sinking, five passes of the roller usually being required.

Runways.—The airport will have four runways, a loading area, three taxi ramps connecting the loading area with the runways, and an apron. All will be constructed of reinforced concrete and will have a total surface of 365,000 sq. yds. without the east-west runway, which is omitted in the present plans, or 429,000 sq. yds. with the east-west runway.

All runways will be 150 ft. wide, with the following approximate lengths: diagonal runways, 5,000 and 4,500 ft.; north-south runway, 4,500 ft.; and east-west runway (proposed for later construction), 5,000 ft. The width of the taxi ramps will be 100 ft., the apron 150 ft., and the loading area 300 ft. All the unpaved area will be seeded. All runways will be bordered on both sides with a graded area 100 ft. wide, which will also be seeded, making a total graded runway width of 350 ft.

Runway paving design is based on an airplane load of 100,000 lb., distributed evenly between two wheels, with an impact factor of two, based on a tire pattern approximately 20 by 39 in. Catchbasin and manhole rings and covers are made of semi-steel having a tensile strength of at least 40,000 lb. per sq. in., which is sufficient to support a similar loading.

The runways, taxi ramps, apron, and loading area, as shown by figure 4, are not crowned but are provided with a 1 percent slope along their entire width in the direction of surface runoff. They are not provided with subdrainage. Also, no part of the graded area will have a slope greater than 1 per cent. The maximum grade of the runways, in a longitudinal direction, will be one-half of one per cent.

Where the runways intersect or join, the surface contour deviates from a straight line in order to avoid the resulting ridge marking the meeting of the plane surfaces. As a runway approaches an intersection, the

surface is gradually made convex, but not enough to produce a crown. The new surface is made to assume the shape of a parabola represented by the following formula, which was first developed and used by the Wisconsin Highway Department:

$$y = \sqrt{\frac{d^2}{10} + 9} - 3$$

where y = elevation above lowest point of curve in inches, and d = horizontal distance in feet measured from the lowest point of curve. The resulting curve is flatter at the edges than a true parabola, and it lies between a true parabola and a straight line.

A 7-in. bituminous stabilized base is laid on the finished subgrade before the concrete is poured. This base consists of 9 gal. of AES 3 per cu. yd. The two-fold purpose of this base is to break up any capillarity that would cause the soil to become spongy, and to provide a path that would allow any leakage through the concrete to find its way to the drains along the runoff edge.

The concrete for the runways has a 1:2.5:4.0 mix



Fig. 3.—Compaction Roller Usually Required Five Trips to Give Satisfactory Density

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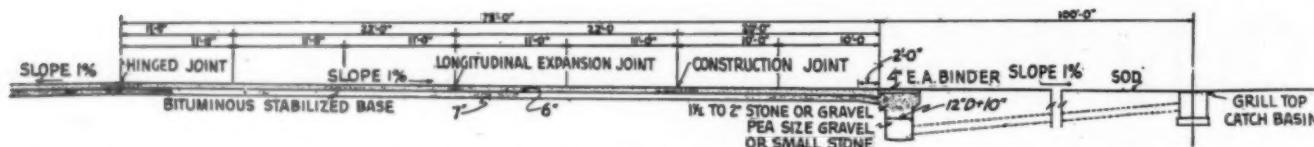


Fig. 4.—Typical Cross-Section of Half Section of Runways. The Cross-Section of the Loading Area, Apron, and Taxi Ramps Are the Same Except for Width

and is being laid and finished in strips 22-ft. wide, except that both outside strips are only 20 ft. in width. Only vibrated concrete is poured, with the cement

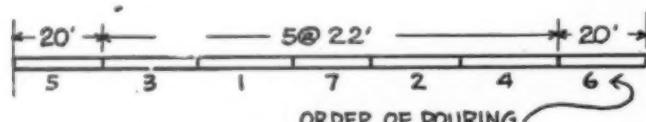


Fig. 5.—Showing the Order in Which Concrete Strips Are Poured for a 150-Ft. Runway. Note That Center Strip Is Poured Last

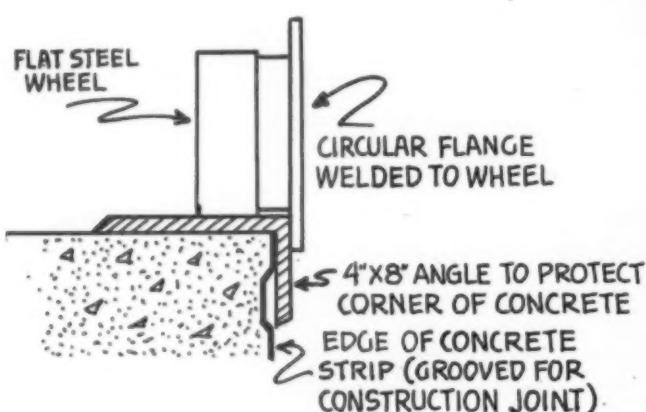


Fig. 6.—How Angle Iron and Wheel Flange Are Arranged When Pouring the Last (or Middle) Strip of Concrete. The Angle Protects the Edge of the Adjacent Concrete Strip and the Flat Steel Wheel Spreads the Load on Angle Iron

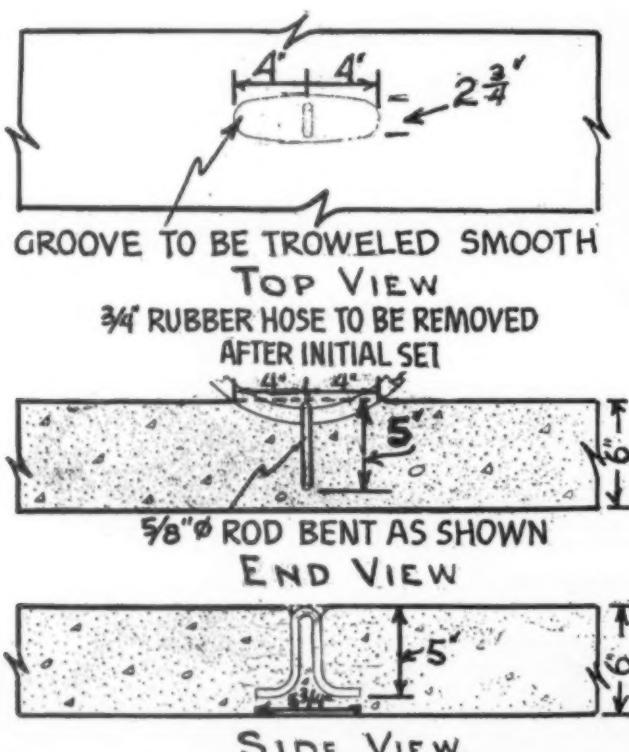


Fig. 7.—Design of Tie-Down Unit Showing How Concrete Is Dished Out So Tie Down Need Not Project Above Concrete

content reduced from 1 1/2 bbl. of cement per cu. yd. to 1.35 bbl. per cu. yd. because of vibration.

Aggregate is stock-piled separately by class: Fine aggregate, torpedo sand, No. 100 to No. 8; class "L" aggregate, No. 8 to 1 in.; and class "U" aggregate, 1/2 in. to 2 in.

Since it is desirable that at least three days elapse between adjacent pours, the strips are poured in a staggered order, with the center strip poured last, as shown in figure 5. In order that the edge of the concrete adjacent to the center strip will not have to take the load during pouring of this strip, the load is carried on flat steel wheels to which are welded circular flanges which ride on a 4 by 8-in. angle protecting the edge of the concrete. The arrangement of the angle, wheel, and flange is illustrated in figure 6.

The loading area will contain 3,000 tie-down units, imbedded in the concrete at 10-ft. intervals, grid system arrangement, as shown in figure 7.

Details of reinforcing mesh and of joint arrangement for 22 ft. pouring width are shown in figure 8. The 20 ft. pouring width is similar except for width of fabric. Details of transverse joints are shown in figure 9. Longitudinal joints are similar.

Drainage.—The airport area is being graded to impound all surface water at certain points, where it will be collected in catchbasins and discharged through underground piping.

Drains are placed along both edges of the runways, taxi ramps, and loading area, thereby draining the paved area as well as the seeded areas which slope toward the pavement. The drainage from the concrete apron, which abuts the hanger floor, is in a direction away from the hangar and toward the drains located along the runoff edge. The drainage from the 100-ft. surfaced grade on the runoff side of the runways is collected in catchbasins which drain into adjacent manholes. The runoff from the unpaved areas is impounded at suitable locations and drained off by means of catchbasins and interceptor drains which connect with the drainage sewers.

The runway drains and interceptor drains consist of perforated, corrugated, galvanized pipe laid on 2 in. of pervious material in the bottom of trenches and back filled with crushed stone, as shown by figure 10. For the runway drains the surface is stabilized with a binder, while pervious top soil laid on a straw mat, is used for the last few inches of backfill for drains in the unpaved areas.

Since the intersection of the two diagonal runways lies a little off from their intersection with the east-west runway, the area bounded by these three runways required a paved surface of about 8.8 acres, with a maximum lineal dimension of about 1,250 ft. Since this area is bounded by three surfaces having slopes in different directions, the development of a surface that would provide drainage for the area and whose slope would be smooth and gradual at all points, presented an unusual problem. The following solution was decided upon: A circle is drawn tangent to the inside edges of the three 150-ft runways. The contour of the runways where they border this area will be built to the Wisconsin curve. Between the runways and the

*When tanks were only
tractors with tin hats—*



Hyatts kept them going—then
Hyatts keep them going—now

TANKS... the "surprise weapon" of the Allies in the last war... were inspired by tractors with crawler treads perfected by Holt. Cushioning the shocks, keeping operating parts running true, Hyatt Roller Bearings helped carry the load and ably won their chevrons. Then back to "civvies," improved Hyatts have been doing their peace-time job well ever since. Therefore, these dependable bearings are again being drafted for tanks as well as army trucks, gun mounts, airplanes and other equipment in today's defense program. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, N. J., Chicago, Pittsburgh, Detroit, San Francisco.



PHOTO BY U. S. ARMY SIGNAL CORPS.
Like tanks, Hyatts have been improved in design, but their traditional quality manufacture prevails even through "all out" production.

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ROLLER BEARINGS

(At top) Allied photo taken "Somewhere on the Western Front," 1915 is that of a Holt Caterpillar Tractor with front wheel... prototype of present "Caterpillar" full crawler tractor of today.

circle, the surface contour will be a true parabola, and an inverted parabola will be employed between all points in the circle and the center. Since the center of the circle will be the low point to which the interior of the concrete area will drain, it will be provided with a catchbasin which will drain to an adjacent manhole.

To meet anticipated drainage requirements, based on the yearly rainfall curve for the locality, the airport will be provided with a drainage system that will handle 1 in. of surface water in 2 hours. Based on a coefficient of shed of 50 per cent, this will take care of 1 in. of rain per hour.

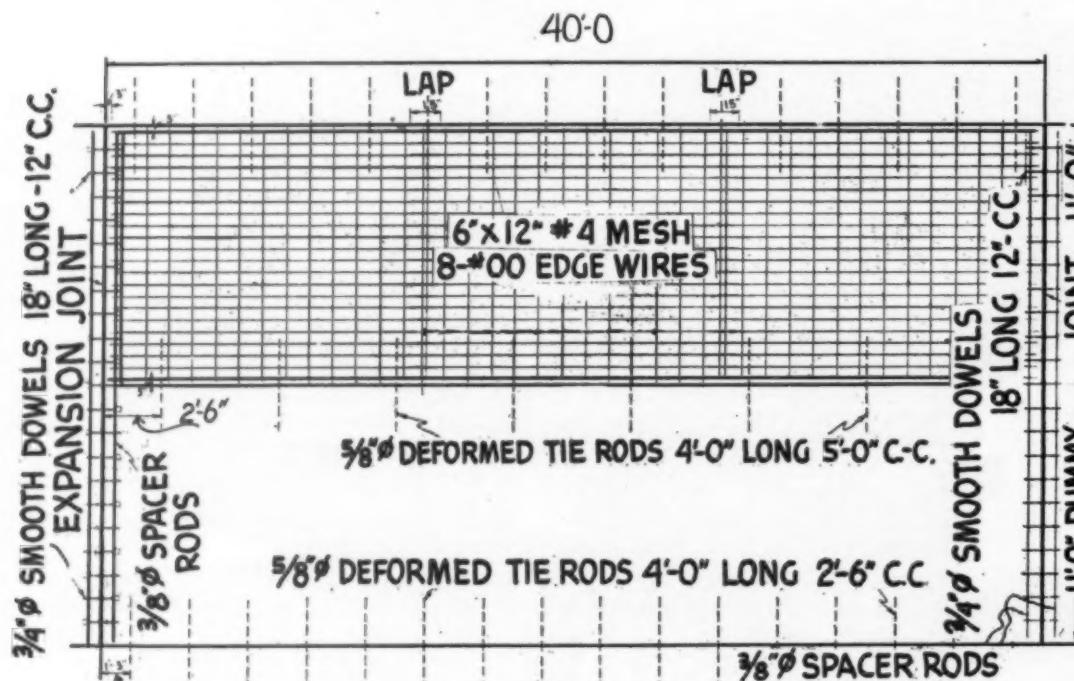
To obtain this drainage capacity, 11.88 miles of interceptor, runway, and regular drains are being laid, with catchbasins located at impounding points, and with brick manholes spaced suitable distances apart. The interceptor drains and the drains along the edges of the

paved areas will be of perforated, corrugated, galvanized pipe, 6 to 24 in. in diameter, bituminous-lined, laid in trenches and covered with pervious material as shown in figure 10. The regular drains will consist of corrugated galvanized pipe, 8 to 21 in. in diameter, bituminous-lined and paved, and also concrete pipe 24 to 48 in. in diameter. The lineal footage of the various sizes of pipe in the three classifications is given in the accompanying table.

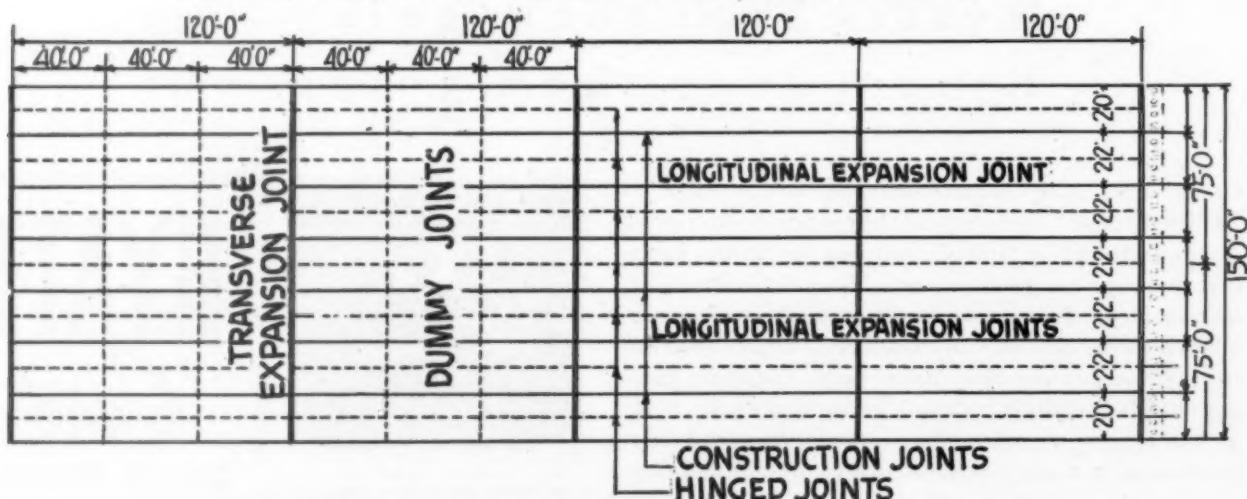
AIRPORT DRAINAGE

TOTAL LENGTHS FOR CORRUGATED PERFORATED PIPE

Size in In.	Length in Ft.	Size in In.	Length in Ft.
6	12,716	15	3,298
8	12,238	18	990
10	8,540	21	746
12	5,528	24	1,008



REINFORCING PLAN FOR 22' POUR



RUNWAY PLAN

Fig. 8.—Showing Reinforcing Mesh and Arrangement of Joints. The 20 Ft. Pour Width Is Similar Except for Spacing Between Individual Reinforcing Wires



SCOOPS THE BIG DITCH!



69 Super-Duty Macks will haul 50,000,000 cubic yards of rock and earth in construction of new Panama Canal locks

The Job To Be Done—One of the largest excavating projects ever attempted—and most important in Western Hemisphere defense. The construction of the third locks of the Panama Canal. **The Truck To Do The Job**—M A C K. This dump truck order is the largest ever awarded—a tremendous tribute to Mack's ability to manufacture superior trucks. 56 of these 69 powerful super-duty trucks will be the huge six wheel dumpers—with 25 yard capacity! To finish the construction will take almost four years—requires that those Mack powerhouses be on duty 22½ hours per day! When the Panama Constructors and the Martin Wunderlich-Okes Construction Company chose Mack—they knew *Mack to be the truck*—to provide rugged power, long range dependability—to cut layup time to a minimum.

Mack has the right model for every trucking need—whether a 1-ton Light Mack for light deliveries—or a 45-tonner for use in open pit mining! Gasoline or diesel power. Write today for complete information on a Mack to fit your trucking requirements. Mack Trucks, Inc., New York, N. Y.



THE MOST COMPLETE LINE OF TRUCKS IN THE WORLD—1 TO 45 TONS AND ALL "HEAVY DUTY"

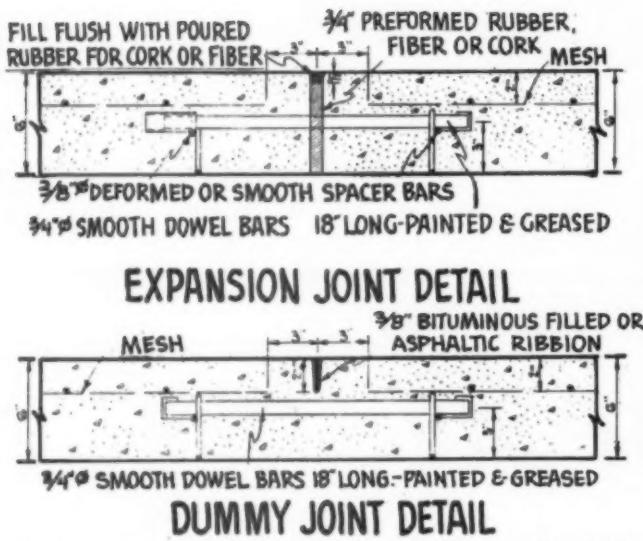


Fig. 9.—Transverse Expansion Joint and Dummy Contraction Joint Details. Longitudinal Joints Are Practically Identical, Differing Only in Length of Sleeve Over Dowel. Hinged Joints Show in Fig. 8 Are Merely Dummy Joints Over Continuous Reinforcing

TOTAL LENGTHS FOR CORRUGATED OUTLET PIPE

Size in In.	Length in Ft.	Size in In.	Length in Ft.
8	3,064	15	3,148
10	802	18	180
12	534	21	842

TOTAL LENGTHS FOR CONC. OUTLET PIPE

Size in In.	Length in Ft.	Size in In.	Length in Ft.
24	2,170	42	500
30	4,200	48	1,156
36	1,216		

Fencing.—The entire proving ground area is bounded by 47 miles of 96-in. chain-link galvanized wire fence mounted on 3-in. H-sections imbedded in 36 to 46 in. of concrete and extending to 6-ft. above ground. The lower 2 ft. of the wire fencing is imbedded in the concrete footing. The uprights support Y-type riders at their top, each leg of the Y carrying three strands of barbed-wire. The fence is provided with concrete weirs and grills at each of 24 places where streams enter or leave the area. The grills are removable for cleaning. The largest weir and grill is 238 ft. long. All have concrete footings doweled in the rock in the stream beds.

Equipment

Rapid progress has required that equipment be maintained in readiness for use whenever needed. Obnoxious delays occasioned by having to replace broken wire rope on such equipment as scrapers, bulldozers, and shovels have been reduced to the minimum by using fatigue-resistant rope. Having high resistance to fatigue, preformed rope is being used on equipment of this type to obtain longer rope life, reduce the cost of rope replacement, and cut down outage time required for re-ropeing. The use of rope having small wires also is helpful, because severe abrasion is not present. For example, the average service life of the hoist rope on the 2½-cu. yd. shovel used on this project has been increased from 108 hours for 6 by 19 non-preformed rope to 720 hours for 6 by 37 preformed rope.

Various types of equipment are being used for excavating and filling. For shallow excavation, where the surface is to be brought to the final grade line, an elevating grader excavates to grade and dumps the exca-

vated material into bottom dump Euclid buggies for transporting to the areas to receive the fill material. Carrier-type scrapers are used for deeper excavations up to about 3 ft. For still deeper work, a power shovel, loading into buggies, is employed.

The following equipment is being used on the project for grading and trenching: 8 Allis-Chalmers tractors, 16 Caterpillar tractors, 8 Euclid tractors with 10-yd. buggies, 2 LeTourneau bulldozer attachments, Euclid bulldozer attachment, Baker bulldozer attachment, LeTourneau Pushdozer attachment, 2 LeTourneau Angledozer attachments, 6 LeTourneau scrapers, 2 Gar Wood scrapers, 4 Caterpillar graders, 2 Adams graders, Baker road rotoer, 2 LeTourneau sheepsfoot rollers, Allis-Chalmers elevating grader, 2½-yd. Northwest shovel, 1½-yd. Lorain shovel, Koehring crane, Northwest dragline, Buckeye trenching machine, Barber-Greene trenching machine, Carr scarifier, 5 Ford trucks, and 1 Dodge truck. For the concrete work, two Rex pavers are being used, with an additional paver as stand-by. Blaw-Knox vibrating finishers work the concrete slabs.

Personnel

All layout and structural design, as well as supervision of construction and inspection, are in charge of Russ & Harrison of Indianapolis, Ind. The general contractors for all work are Simmons & O'Connor of Ft. Wayne, Ind.

Lt. Col. D. C. Cabell heads the War Department's staff in charge of the project. Russ & Harrison personnel includes: Herbert Bloemker, Chief Engineer; John A. Kelley, Chief Design Engineer; Francis A. Kelley, Field Engineer; Dolphus E. Whitesell, Airport Designer; G. Macy Patterson, Airport Supervisor; and Jos. A. Kiovsky, Highway and Railroad Designer.

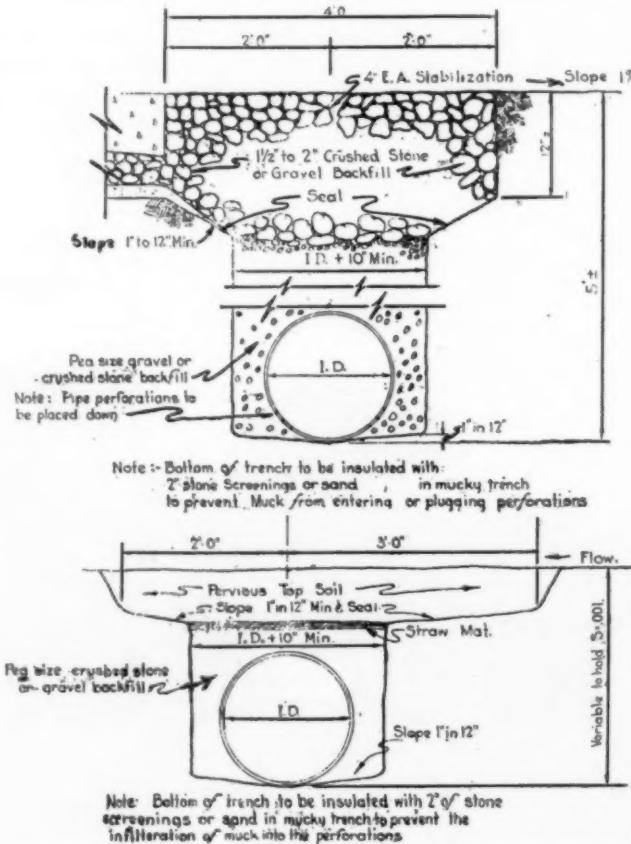


Fig. 10.—Showing Design of Edge of Runway Drain (Above) and Interceptor Drain (Below)

PLAN NOW!

TO HAVE THIS PROTECTION
AGAINST NEXT WINTER'S
HIGHWAY HAZARDS AND SNOW DAMAGE



NEXT year is going to be different! The increase in industrial production, the very definite probability of railroads being overloaded by war material traffic, the induction of many men into army training is going to throw a new and heavier load on the highways. Highway traffic is on the increase and due for a bigger increase. Lighter traffic is going to find it expedient to use secondary roads—and snow clearance is going to become a bigger, more important job than ever!

Next winter open roads are going to come under the "must" head and you are going to need equipment that will meet any condition!

Now is the time to plan to be able to meet any snow problem—with SNOGO! Snogo does it better, in light snow or heavy. Snogo is absolute assurance that your roads will be open.

Plan now to meet all conditions—plan for greater winter highway safety—plan for more miles of open road at lower cost—plan to cut the cost of spring road destruction and have more money for new roads.

We can't tell you all about Snogo here, but we have much information about how Snogo has met problems all over the country. It is yours for the asking, of course.

HIGHWAY OFFICIALS:

Have you checked into SNOGO recently? Do you know about the wide range of SNOGO models and prices? There is a size for every budget, from 1½ tons to the largest four wheel drive type of truck.

There is no excuse today for not having SNOGO protection!

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MANUFACTURING CO.

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SNOGO

For Complete Snow Removal

Progress Depends on Open Roads

MUNICIPAL SNOW REMOVAL

A Discussion of the Problems Confronting the Average City

MUNICIPAL snow removal has been increasing rapidly and steadily since the advent of the general use of automobiles. It now ranks as a major governmental activity in those communities which lie in the snow belt. The persistent clamoring of business men, motorists, and other citizens for the full-time, safe use of streets and highways makes it appear that the desired level of service has not yet been reached and that more complete snow removal and better pavement protection may be required in the future.

Snow removal, in its broad sense, includes the clearing of snow from pavements and sidewalks, removing the material from the streets, disposing of it, and eliminating icy conditions on street surfaces. It is essentially emergency work because the pavements must be cleared or protected promptly at any time of day or night when snow falls or ice forms on streets. Usually under such conditions a tremendous amount of work must be done in a very short time. There is no time at such critical periods to plan or organize activities or to obtain equipment and supplies. All preparations must be made ahead of time so that everything is in readiness to go into action on very short notice to meet any condition that may develop.

Justification for Snow Removal

Economically, snow removal operations far beyond those now undertaken can be demonstrated to be sound. In addition, however, there are important social, public health, and safety considerations that constitute equally cogent reasons for a rather complete program of emergency removal of snow and ice. Practically all municipal emergency services are motorized, as are commercial delivery services and other services vital to the protection and well-being of the inhabitants of urban areas. The delivery of milk, food, and fuel cannot be safely interrupted for more than a few hours. The prompt and rapid movement of fire equipment, police cars, ambulances, doctors' cars, and emergency service repair trucks cannot be interfered with at all without the possibility of disastrous results.

If streets and sidewalks are not promptly opened to safe travel after heavy snows, citizens cannot reach their places of work, businesses cannot function, and a huge irrecoverable loss occurs. Deep snows and ice cause numerous delays, inconveniences, and actual dangers to pedestrians.

Planning for Snow Fighting

Effective snow fighting depends to a large extent on careful and complete planning so that everything is in readiness to function smoothly and quickly when the need arises. Broad minded policies as to the extent of removal operations and the amount of expenditures should be fixed before the winter season arrives and before any detailed plans are made. Appropriations for

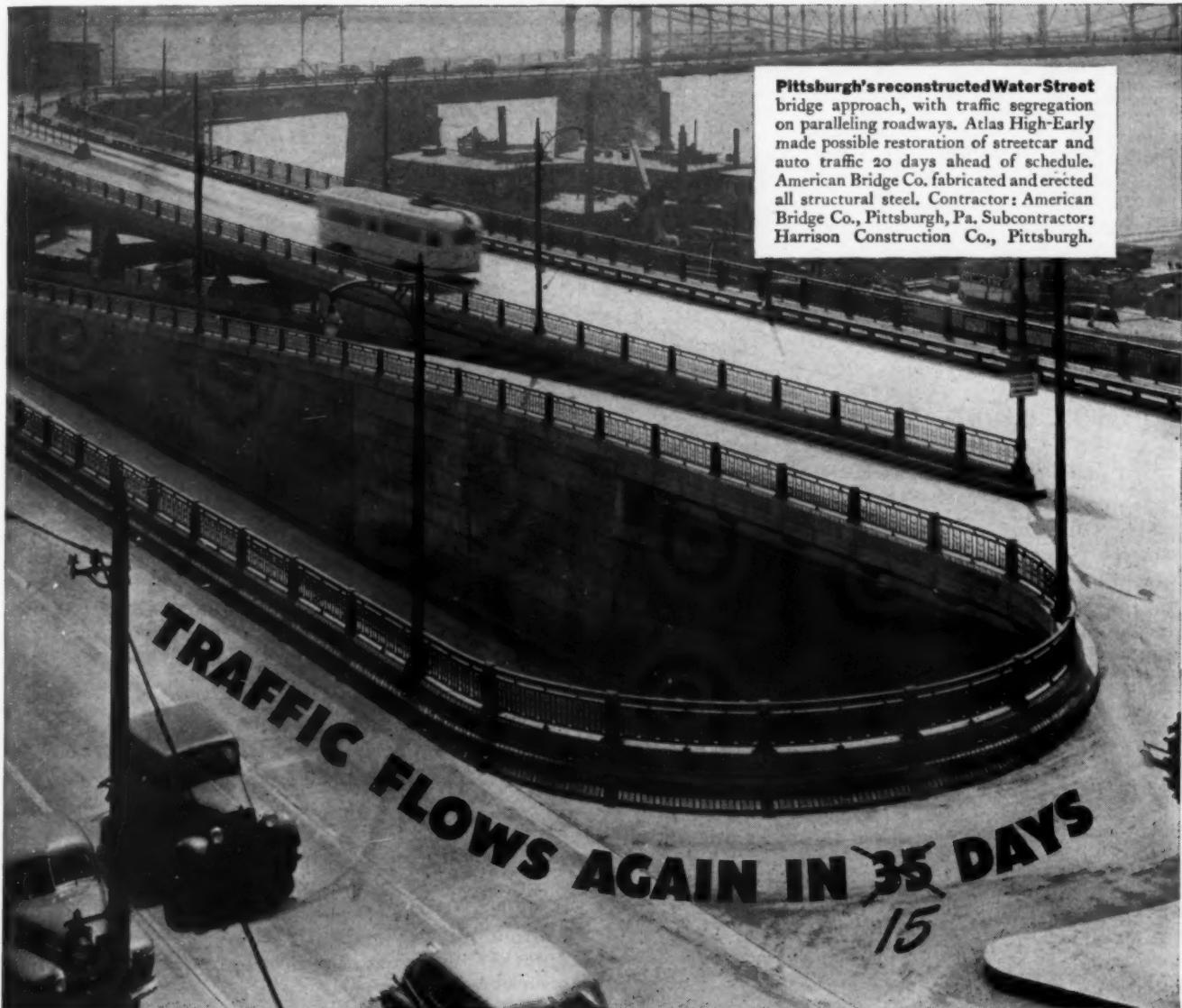
this activity cannot be interpreted as of establishing such policies because the severity of storms and the amount of work are not predictable. Therefore considerable latitude must be given to the officials in charge of snow removal, within the scope of the general policies.

Organization for Snow Fighting.—Existing organization plans for street cleaning or other regular activities are usually not adaptable to emergency operations. It is generally found more desirable to formulate an entirely new organization arrangement for snow removal and ice elimination work. The two essentials are that the plan must be simple and that lines of authority and responsibility must be definite. As in most emergency operations, there is a tendency to use a geographical division of work at a relatively high level and to make district and sectional officers entirely responsible for all snow and ice activities within their assigned areas. Some cities, however, use this method only for snow loading and hauling, on which the largest number of workers are used, and administer plowing and the elimination of icy conditions on a functional basis. In the larger cities using this plan there will, of course, be a geographical division of the work in these latter activities at a lower level. In a city of moderate size it is probable that one man can direct plowing activities for the entire community. It is not unusual to find a regular street cleaning organization charged with the responsibility for treating icy surfaces, particularly in those regions where the elimination of icy conditions is frequently needed.

The organization plan must be developed in great detail because of the general practice of utilizing the services of all municipal employes who can be spared from their regular tasks. It is not unusual to assign individuals from the engineering, street, sewer, water, refuse collection, and other services to posts in the emergency organization, and therefore it is imperative that each such employe know precisely his status while engaged in the supplemental activity. He should understand exactly his responsibility and authority, to whom he is immediately responsible, and what duties he is expected to perform. It is advisable to give each employe so assigned a written statement showing this information as well as such other matters as the place of reporting, when to report, and how to communicate with his superior in emergency periods. The development of an organization chart may be very helpful in providing a clear portrayal of the arrangements.

Arrangements for Personnel.—Plans must be perfected in advance for supplying the necessary supervisors, equipment operators, and laborers, so that no delay is caused in beginning snow-fighting work. Sometimes it is not necessary to look outside of the municipal organization for workmen, except for the most severe storms. In other places efforts are made to keep all services operating normally throughout the emergency periods, and therefore employes cannot be transferred from many of the regular operating agencies. In such cases arrangements are made with contractors, employ-

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20 DAYS SLASHED FROM CONCRETING SCHEDULE —with *Atlas High-Early Cement!*

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Here's how he figured it. The whole section of pavement required five placements of concrete. Normal

portland cement called for 7 days' protection and curing time on each placement . . . or a total of 35 days.

But Atlas High-Early required only three days' protection and curing. So Atlas High-Early got the job . . . and finished it in 15 days. Street cars and automobiles rolled again on Water Street 20 days sooner.

Specify Atlas High-Early cement for a cure in time that will save trouble and make money for you.

Send now for new folder, "Case Histories of Days and Dollars." It shows you the benefits of this "speed-up" cement. Write to Universal Atlas Cement Co. (United States Steel Corporation Subsidiary), Dept. R5, Chrysler Bldg., N. Y. C.

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RS-H-33

ATLAS HIGH-EARLY CEMENT

A UNIVERSAL ATLAS PRODUCT



ment agencies, and relief agencies so that a large number of men will report promptly at the snow-fighting offices or garages.

Equipment operators are customarily assigned in advance to specific equipment and to definite duties, so that at the first call they can proceed directly to the scene of their activities and begin operations. Usually such operators are regular municipal employees or are recruited from local contractors or commercial fleets.

Definite means of communicating with the employees should be worked out in advance. Sometimes general mobilization orders go out through local radio broadcasting stations; at other times each foreman or supervisor telephones to his men or otherwise advises them of the time to report. In certain cities, general instructions require employees to telephone the emergency offices when snow starts to fall or when ice begins to form on the streets.

Arrangements for Equipment.—It is essential that adequate equipment be available and in good operating condition for snow-fighting work. The municipal equipment can be kept in readiness, but it is rare for a city to have a sufficient number of trucks to do the requiring plowing or hauling. Definite arrangements must be perfected in advance with contractors and fleet owners so that the needed equipment can be called out on short notice. Usually there are standing orders for certain equipment to be sent to specific locations for each storm when the first notice is given. As the work progresses, additional trucks are called out when they are needed.

The arrangements should include definite plans for



Barber-Green Snow Loader Working on Streets of Salem, Mass.



Caterpillar Tractor with LaPlante-Choate Plow Working in Warehouse District

operation. Routes and schedules for plowing and loading should be developed, and specific assignments should be made so that each driver and crew knows precisely the work to be done.

Methods of Removing Snow and Ice

Practically every urban community in the snow belt does some snow-plowing on pavements, or sidewalks, even in those regions where the deposits normally disappear within a few days. Snow loading and hauling is less generally practiced, although many of the very small cities are finding it necessary to transport some of the snow from business and arterial streets. Likewise the treatment of icy pavements is developing rapidly and is becoming widely employed.

Snowplowing.—Snowplows push or cast the snow from the path of the equipment and pile it in windrows on one side or both sides of the swath, depending on the type of plow used. One trip is sufficient for sidewalks, but on roadways two or more trips are necessary. A recent survey shows that 73 out of 78 cities in the snow belt plow pavements at each snowfall; 23 out of 76 cities plow sidewalks, with 3 plowing sometimes; and 69 out of 83 cities plow crosswalks.

The straight blade plows are by far the most common type in use in cities, although the V-blade plows are used to some extent for very heavy snowfalls. Rotary plows are seldom used in urban areas. A straight blade plow consists of a steel blade about 10 feet long, a special mounting device, and a truck or tractor on which the plow is mounted. The blade, often referred to as a mold board, varies from 12 inches to 36 inches in height. The supporting device is usually of the "A" frame type and can be attached readily to all standard trucks and tractors. Generally, these frames are mounted on the vehicles in the fall so the equipment can be made available for plowing simply by attaching the blades. The blades can be raised or lowered hydraulically or mechanically, and can be adjusted to different angles with the direction of movement. Most such plows can be controlled to throw the snow toward either side of the vehicle. Many cities use only 5-ton or larger trucks or tractors to insure good traction and adequate power. Some communities use only four-wheel drive trucks for plowing. Nevertheless, satisfactory operation can be secured with much lighter equipment, particularly when the snowfalls are moderate. Usually some ballast must be placed in trucks to secure the best traction, and tire chains are generally used. Crosswalk plows are simply short-bladed straight-blade plows mounted on small tractors. They are used to open crosswalks and to clear catch basins and gutters.

Some cities wait until a snowfall has stopped before any plowing is started, but it is considered much better practice to begin operations when the snow is from one to two inches in depth and to continue plowing until the snow has stopped and the roadways are clear. Usually the snow is pushed to the gutters, and in some cases over the curbs onto the grass areas. Such practice is necessary on narrow streets and where street car tracks exist. On wide streets, however, it is frequently advisable to windrow the snow in the center of the pavement, if it is to be hauled away later.

Usually there are definite agreements with street car and bus companies as to the sequence of operations on streets used by such transportation agencies, so that congestion can be avoided and effective clearing assured. The street car companies are generally required by franchise agreements to plow the track areas, but it is

(Continued on page 65)



★ Justly popular is this 45-pound Cleveland Sinker, with owners and operators alike. A fast driller, sturdily built, easy to hold, with effective hole-cleaning power and strong rotation, the H10 consistently wins in point of footage per day. Both dry and wet types are available. Chuck for 1" Hexagon x 4¼" is standard, but the smaller ½" Hexagon x 3¼" is supplied when specified. Good for holes to depths of 18 feet and more, in any kind of rock. Despite the demand, we are making unexpectedly prompt deliveries. Wire us where to demonstrate.

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CHINESE ENGINEERS BUILD NEW HIGHWAY NETWORK

ENGINEERS in Free China in the past four years have constructed 80,000 kilometers of modern roads through previously untouched and isolated wastelands, giving China vital new lifelines needed for development of her new economy, and for communication with the East and with the Western World, according to information received by United China Relief. All of these roads have been built in the vast, remote provinces of western China, which before the present war were as undeveloped economically and industrially as our own West in the 1850's. This monumental task has been accomplished with road gangs of farmers, soldiers and peasant women.

China's West had remained in a dormant state for centuries because of high mountain ranges which presented formidable transport problems, and because the rivers of China, although numerous, were too swift-flowing or required extensive dikeing to make them navigable for boats other than junks and sampans.

Within a year after Japan entered China proper in July 1937, China lost 90 percent of her industries that were centered in the rich coastal provinces. Faced with economic defeat, her coolies moved 385,000 tons of industrial equipment into the interior, 1,500 miles away, in one of the epic migrations of history. And the backward West, rich with undeveloped natural resources, full of fertile grazing lands, rich forests and uncultivated farming soil, was "discovered" by a government and nation to which the West previously was known only in legend.

Development of China's West, faced an initial setback because of a total lack of modern roads and transportation facilities. But taking part in the migration of industry was the bulk of Chinese engineers — some 3,000 of them.

All engineers were immediately mobilized by the Chinese Government, and road building to speed moving of troops, material and supplies was undertaken as a first major defense project.

The first job undertaken and the first completed, because of its strategic importance, was the Burma Road. This road, winding from India into South China through malaria-infested plains and mountains was completed within a year and a half, although foreign engineers had estimated that seven years would be needed for its construction.

Construction of highways through the Northwest, to connect China's war capital with Eastern Asia, was started next, and those who gave their efforts—and in some cases, lives—to this gigantic task are the unknown heroes in Chinese communication history. More than one million farmers, soldiers, peasant women and adolescent boys, using little modern machinery, cut 5,000 kilometers of roads out of almost solid rock. They used picks and spades, for the most part, and carried the road over 5,000-foot mountain passes to drive it through.

On section of this highway, running from Kansu Province 1,053 kilometers into Szechuan Province—the heart of Free China—will be a lasting monument to the women of China. The women of Kansu have always been stronger than the men, who were addicted to opium, and these women have always had unbound feet. It is these women—old ladies, farmers' wives, housewives—that Mme. Chiang has called China's most picturesque army. Answering the government's call, they headed for the mountains garbed in the bright blue clothes of the region, with their babies slung on their backs. Engineers could give them few modern tools, and—urged to bring their own—the women turned up with axes, picks, kitchen knives and scoops and even with vegetable choppers. They have made their homes along the route, wherever the day's work ended. This road is nearing completion.

More than 20,000 soldiers and civilians were used to construct the highway from Kansu to Sikiang, commonly known as Chinese Turkestan. This highway, giving China a "back door" through the Northwest border into Russia, is today one of China's most vital lifelines for transportation of supplies. Weekly bus passenger service is maintained.

Roadgangs employed on this highway worked in places where the temperature dropped in winter to 20 degrees below zero, and through isolated sections where drinking water was hauled from places a half-day's march away. The road went through mountains, salt marshes and sand dunes. Excavations were done by gunpowder, and because of ignorance and carelessness of inexperienced handlers, many lives were lost. This highway was paved with pebbles from sandy riverbeds and from The Black Gobi Desert. The roadbed was completed in eight months.



An Illinois City Uses This Austin-Western Motor Grader Equipped with V-Plow in Outlying Districts as Well as in Business Section

(Continued from page 62)

not uncommon for certain entire streets to be cleared by the companies' plows and others by city plows.

Sweeping Snow.—Snow is removed by mechanical sweepers in some cities. This method is particularly adapted to keeping bridges and viaducts clear of snow or to removing lighter snowfalls.

Hosing Snow.—When the temperature is above freezing, snow may be effectively and economically removed by hosing. Streams of water from ordinary fire hose force the snow or ice into inlets or catch basins, leaving the pavement surfaces clean. This practice is not employed unless the temperature is rising, or at least unless there are good indications that the water will not freeze on the pavements.

Snow Loading and Hauling.—Complete snow removal is necessary in congested areas where the entire pavement and sidewalk width is needed for safe movement of vehicles and pedestrians. Such cleaning means that the snow must be moved away, either by loading it on vehicles and hauling it to disposal points or by pushing it into manholes on the storm sewer system.

Loading is accomplished by manual shoveling or by mechanical equipment. Two types of equipment are used extensively, elevating conveyors and power shovels. The special snow loading equipment is all of the elevating conveyor type because it is more economical to operate, has much greater capacity, and requires less street space. Power shovels are used only because cities may own them for other work and consider their less efficient use as snow loaders more economical than purchasing machines that may be used only a few days a year. This does not mean at all that the use of regular snow loaders is extravagant. The question is one of engineering economics. If the loaders cannot do the required work cheaper than manual or power shovel loading, everything considered, then they should not be used. It should be pointed out that many cities are finding that the saving in time in loading the trucks will more than pay for owning and operating the loaders. A study by the American Public Works Association in 1938 indicates that 18 out of 82 snowbelt

cities use both machine and hand loading, 10 others use machine loading only, 50 others use manual loading only, while only 4 do no loading at all.

The vehicles used for snow hauling should be easy to load and unload. Open dump trucks, trailers, and semitrailers are widely used. Obviously small capacity vehicles are not suitable except where the loading operations are very slow and the ratio between loading time and hauling time is high.

Practically all cities in the snow belt do some manual loading in scattered isolated places where it would not be practical to transport special equipment. Many communities do all loading manually, either because it is more economical or to give employment to needy citizens. Whole streets may be cleared by manual loading after the plows have piled the snow. Often only the important intersections, crosswalks, and business areas are cleared. Manual loading crews are usually assigned to removing snow from streets near public buildings, churches, and places where funerals are being held.

Disposal of Snow.—Snow may be dumped into lakes, rivers, and other water courses; piled on vacant lots; or dumped into sewers. Relatively short hauls are essential to economical disposal, so it is advisable to have arrangements made for dumping in each district. Usually, unlimited quantities of snow may be dumped into lakes or large rivers, but smaller streams may be incapable of melting and carrying away all the snow that would otherwise be dumped into them. The same problem must be faced in connection with the use of sewers. Unless the flow is sufficiently large it may not be practical to use this plan, although it is customary to speed up the melting of the snow and to increase the flow by directing streams of water through fire hose into the manholes which are used.

The supervision of disposal activities requires considerable attention so that the movement of vehicles will be orderly and efficient, and so that the whole process may be safe and economical. The necessary facilities at disposal sites must be prepared in advance. Sometimes dumping platforms, ramps, roadways, or special safety devices must be erected. Plans for hand-



International Truck with V-Plow Opening a Park Drive



In Watertown, N. Y., Caterpillar Diesel No. 12 Motor Patrol Widening After a 58-Inch Snow Fall

ling traffic should also be developed in advance of the emergency periods.

Snow melting has been proposed on numerous occasions, and several machines have been developed and tried by cities in this country and in Europe. Generally, they have not been successful because they are quite slow in operation and because the delivery of fuel oil or coal is very difficult during storms. In this country the expense of melting is still greater than disposal by other means.

Eliminating Icy Conditions

Ice on city pavements and sidewalks causes many serious accidents to both pedestrians and vehicles, and it is responsible for much delay to traffic and for increased congestion of the streets. The demand for full-time, safe use of streets makes it necessary for cities to remove the ice or otherwise make the pavements safe for use. Ice treatment has become a regular part of the whole emergency problem of keeping the streets clear during winter months.

Ice cannot be removed from pavements mechanically except when the temperature is well above the freezing point. Ordinarily the ice must be melted, or the surface covered with an abrasive material. Salt or calcium chloride is used for melting snow, and sand or cinders to provide traction on the ice surface. These materials are used together in different combinations in many cases. The survey of the American Public Works Association shows that in the 83 municipalities studied, 41 cities use sand alone, 14 use cinders alone, 39 use salt alone, 29 use calcium chloride alone, while 45 use a mixture of an abrasive and a chemical.

Sand is used most frequently, probably because it is readily obtainable in all communities. About two pounds of sharp sand to a square yard will prevent slipping by vehicles. When used alone, however, sand

freezes in stock piles, and it tends to roll under tires rather than dig into the ice. When salt or calcium chloride is added to the sand, such stock piles will not freeze, and the chemicals cause the ice to melt sufficiently to imbed the sand particles.

Cinders are preferred to sand by many officials. Rather large quantities are available in industrial communities for the cost of hauling, but they cannot be secured at all times in some other cities. The cinders should be free from clinkers and ashes when applied. This material does not tend to roll under traffic, but it is easily blown from ice surfaces by the wind. It also freezes in stock piles unless the cinders are covered or unless chemicals are mixed with them. Excellent results are secured with mixtures of cinders and salt or calcium chloride.

Both salt and calcium chloride are used alone with much success, although much treatment is not effective at very low temperatures. Generally it is not economical or effective to use salt when the temperature is less than 15° F. or calcium chloride when it is less than 8° F.

The ice treatment materials may be spread by hand or machine from trucks, or they may be spread by hand from stock piles or supply boxes placed along the streets. Some special trucks are made so that the material feeds through the bottom of the body onto a spreader so as to place the abrasive or chemical ahead of the rear truck wheels. The usual method of mechanical spreading, however, is to distribute the material by an auxiliary spreader attached to the rear end of trucks. The material is shoveled into the hopper of the spreader, or it may be fed by cracking the tail gate of the dump truck and elevating the body. It is not usual to spread abrasives or chemicals or mixtures of these materials over the entire pavement area. Usually they are placed on hills and curves and at intersections, particularly where vehicles stop and start. The vehicles will soon spread the material over greater areas.

Interference by Parked Cars

Parked vehicles seriously interfere with snow removal activities, even more so than with street cleaning. It is essential to effective clearing that parking be prohibited during emergency operations or that the vehicles be removed by the police or by the emergency organization. There is considerable evidence, however, that citizens are usually more willing to cooperate during emergency periods, and that city officials have less objection to enforcing no-parking ordinances rigidly.

Measurement of Snow and Ice Removal Work

The snow clearing mile is the unit of measurement generally used for plowing. It represents one mile of street cleared by plowing, regardless of the number of trips required to complete the operation. Usually such information is supplemented by reporting the number of miles traveled while plowing.

The unit used for snow loading and hauling, and for snow disposal, is the cubic yard of snow measured in the hauling vehicle. It is often advisable to know the total mileage traveled by hauling vehicles or to use a combination unit such as the cubic yard mile.

Measurement is difficult for ice elimination operations. Probably the volume or weight of sand or chemicals spread are the units most widely employed. The most useful unit would be the area treated, but it is ordinarily quite impossible to estimate or measure such areas easily, particularly where the spreading is done only at intersections or other dangerous spots.

MARMON-HERRINGTON All-Wheel-Drive



**AMERICA MUSTERS HER
SHOCK TROOPS FOR THE
GREAT OFFENSIVE AGAINST**

"General" Snow



"General" Snow is nothing to smile about in our northern tiers of states, where the blinding, clinging menace piles deep on highways and streets. To keep roads open and traffic moving requires heroic effort by snow-removal crews, sometimes for months at a stretch.

But given the right kind of equipment to work with, these men face the worst blizzards with courage and confidence. Even the deepest drifts are swept clear with plows mounted in front of sure-footed, fast moving Marmon-Herrington All-Wheel-Drive trucks.

For these economical, sturdy and dependable

vehicles have the ability to maintain traction, without excessive loading, even on the slipperiest pavements. With all four or all six wheels actually taking hold and pulling, Marmon-Herringtons keep going when conventional drive vehicles would be stopped dead in their tracks.

We convert all standard Ford trucks to *All-Wheel-Drive*, and build a complete line of extra heavy duty *All-Wheel-Drive* vehicles in our Indianapolis plant. All standard types of rotary and V-plows are adaptable to these units. With snow-removal equipment dismounted the same vehicles are available for year around road construction and maintenance, where their superior traction enables them to do work no other wheeled vehicle can do. Literature describing all of these vehicles will be mailed on request. New issue Marmon-Herrington Pictorial News shows many snow-removal units in action.

MARMON-HERRINGTON CO., INC. • INDIANAPOLIS, INDIANA, U. S. A.

EDITORIAL

SAVING STEEL

DIRECTOR of Priorities of OPM and the Administrator of OPACS have agreed upon a program for the allocation of iron and steel products among competing civilian demands. They state that this action has been necessary because current demand for both defense orders and civilian purposes is greater than the ability of producers to deliver the required amounts upon scheduled delivery dates. Factors to be taken into consideration by the OPACS in formulating policies and programs were announced in "Civilian Allocation Program for Pig Iron, Ferro-Alloys, Steel Ingots, and Castings, and All Carbon and Alloy Steel Products" issued by Leon Henderson, Administrator. The Administrator of OPACS will take the following factors into consideration in issuing priorities:

- (a) The need to provide adequately for civilian uses essential to the public welfare.
- (b) The degree of hardship upon labor or business resulting from the failure to obtain deliveries when scheduled or from the rejection of orders.
- (c) The past rates of consumption of the products by users thereof.
- (d) The objective of achieving an equitable division of supplies of the products among all users.
- (e) The availability of substitutes for the particular uses for which the products are sought.
- (f) The policy of the administrator to refuse allocation to any person who, in the conduct of his business, discriminates against defense orders.

It will be noted, in reading these conditions that nothing is said about saving steel, unless item "C" could be so construed.

Contributing in a big way to the national defense by saving steel is the non-glamorous item—wire rope. It possesses neither romance, charm, sex appeal nor glamor. Yet, the glamorous 15 yd. shovel and the romantic B-19 bomber could not operate without this bit of "minor" equipment. The steel which can be saved by using preformed wire rope instead of regular wire rope will be forcibly told in the language of national defense by a series of advertisements beginning with this issue.

Over a period of a year, if nothing but preformed wire rope were used, a saving in steel would result which if translated into items of equipment employed in highway construction would make 695 20-yd. scrapers, or 2,400 D-4 crawler tractors, or 4,000 sheepfoot tamping rollers, or 463 34-E pavers, or 2,400 motor trucks. The longer life of preformed wire rope would save around 12,000 tons of steel over the use of regular wire rope.

From the above discussion two fundamental principles are indicated:

1. The value of quality buying; and
2. The fact that there is no such thing as a piece of "minor" equipment.

Anything that reduces the frequency of machine shutdowns, anything that increases the efficiency of workmen, anything that aids production, must have its full share of attention. It cannot be considered "minor." A man who loses a hand from infection caused by the protruding broken wire of a non-preformed wire rope is

just as incapacitated as the man who loses a hand at a press or a buzz saw. In this man's mind, the thing that would save his hand would certainly not be "minor" equipment.

At this time, the saving of steel is industrial patriotism. By switching to preformed wire rope the contractor or other rope user will be doing a little more of his share in helping OPACS with their problem. Quality buying is another form of steel saving and therefore also industrial patriotism. Invariably quality built merchandise outlasts and out-serves inferior stuff. By purchasing quality steel products the difference in steel used is saved for the manufacture of defense products. Help OPM and OPACS on their problems of steel production and allocation—save steel.

CONTINUE THE TURNPIKE

BOTH the engineering and the financial success of the Pennsylvania Turnpike indicates the advisability of continuing it on Westward. With this in mind the Pittsburgh Chamber of Commerce appointed a special six-man committee to study proposed routes westward to the Pennsylvania state line. Following is abstracted from an editorial on this subject in the July 31 issue of the Pittsburgh Sun-Telegraph:

Several routes are to be suggested for the by-pass around the traffic-congested Golden Triangle, we are told.

"One proposed route by-passes the downtown section, but connects with it, from the south side of the rivers; another proposed route by-passes the congested area to the north side of the rivers.

"South side or north side makes no difference to the average citizen, so long as it serves the best interests of the most people.

"The committee which has undertaken the Turnpike extension study is headed by Edward Snodgrass, Jr. The other members of the committee include Richard K. Mellon, Joe C. Trees, L. W. McIntyre, P. B. Reinhold and I. D. Wolf. Their judgment in the matter of approving or disapproving of any site, no doubt will be well considered.

* * * * *

"Walter A. Jones, chairman of the Pennsylvania Turnpike Commission, who brought a "Dream" highway into reality, now proposes that the highway be built from coast-to-coast.

"The Hearst papers have long advocated such a highway.

"The Chamber of Commerce proposed this same idea back in 1933 and recommended that the 10 states which it would cross should finance the venture with Federal aid.

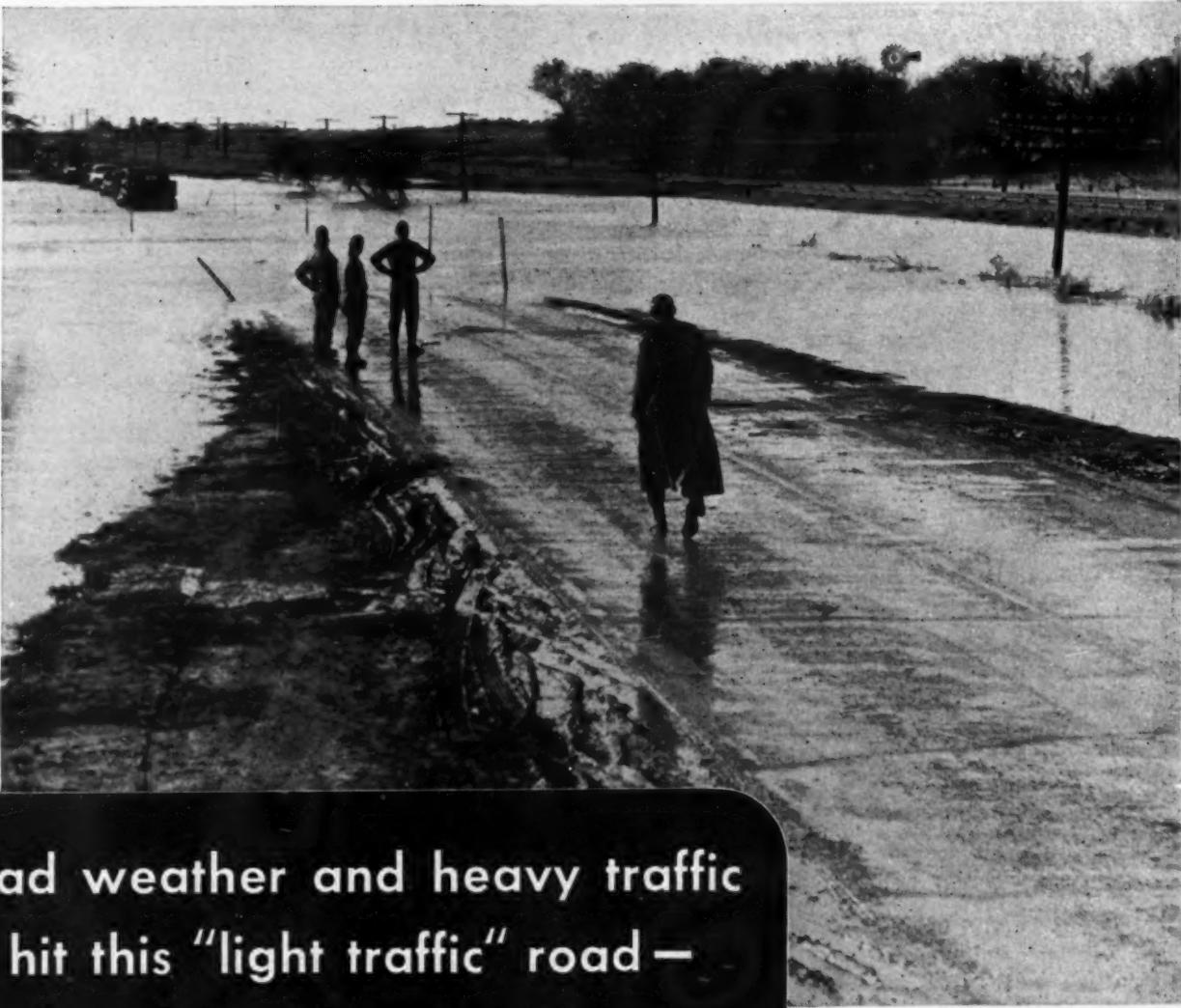
"With billions being spent for national defense, it would seem that this proposed coast-to-coast venture should rank high among the "musts" for the military defense of the nation.

"At least, it should be extended from its present terminus at Irwin and the bottleneck into which traffic is crammed coming into Pittsburgh eliminated."

ROADS AND STREETS has long advocated the need of limited access highways from Chicago and St. Louis eastward to tie into a limited access way between Boston and Richmond. Other places can also justify the construction of such roads but these are badly needed.

Enterprising financiers would do well for themselves were they to promote this proposition. We look forward to a good report from the six-man committee.

Frankly, the writer is of the opinion that this committee could afford to establish an engineering division, as well as a promotional division, and become the leading agency in the development of this needed inter-regional route.



Photo, courtesy: Valley, Texas, Morning News

Bad weather and heavy traffic
hit this "light traffic" road—
but the surface stood up
for it was SOIL-CEMENT

Flood scene (see above) along the
46-mile Soil-Cement road in Kenedy
County, Texas. Built at a \$750,000
saving in first cost over other surface
types considered.

HERE is *proof in performance* that proper laboratory control and procedure on the job enable you to design soil-cement mixes and build light-traffic roads with complete confidence in their ability to "take it."

After severe tests given a 3.8-mile strip of soil-cement road in 1938, this type was chosen for the 46 miles of Hug-the-Coast Highway in Kenedy County, Texas. During its first three months of use, 25 inches of rain fell. One section of road was under water for more than a month. During this period 2,500 men of the 2nd Division Artillery and their equipment moved over the road. Result: less than 200 sq. yds. of damaged surface.

Piling up mileage . . . and savings!
Low cost, plus durability under field conditions of

alternate wetting and drying, freezing and thawing, are pushing soil-cement rapidly ahead. This year's yardage of roads and airport runways far exceeds last year's total. Over 3,600,000 sq. yds. of soil-cement were built in 27 states in 1940, with many hundreds of miles of these roads now in service. Note that soil-cement is not recommended for heavy-duty service, where portland cement concrete is the most economical pavement.

Get all the facts about the durability and economy of soil-cement roads, and about the simple testing and control methods that assure good results with your soils. Write today for the new, revised edition of the manual, "*Soil-Cement Roads*," and a new leaflet "*Soil-Cement Construction Details*," (free in the U. S. and Canada).

PORLTAND CEMENT ASSOCIATION, Dept. A9-28, 33 W. GRAND AVENUE, CHICAGO, ILLINOIS
A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

Contributed Editorial

ROAD PROGRAM FOR DEFENSE

By C. E. FOWLER

ROADS and bridges are of the utmost importance to the entire United States. Yet President Franklin D. Roosevelt vetoed the Defense highway bill when it was passed by Congress, on the basis that it had become a Pork Barrel measure. It was passed over the veto by the Senate, only to lose out in the House. It is believed that the real reason for the veto was because a presumably erroneous assumption—that less than 25 per cent of the thousands of bridges needed to be strengthened, and a similar small percentage of the roads needed to be patched up or rebuilt. This was likely true for the 16-ton tanks originally proposed and built for the Army, but when maneuvers began, these were found to be much too light, and the generals demanded 25 to 35-ton tanks, which would have required about 90 per cent of the bridges to be strengthened. What is the use of stopping at 35-ton tanks? If real war ever reached the United States then 50-ton tanks, as heavy as those of the Nazi army would be needed. Under these conditions, 100 per cent of the bridges would have to be strengthened.

The real way to economize, if economy is a factor in national defense, is to pick out the more important strategic roads for improvement. Take the case of Tennessee, for example, as the writer sees it. Troops will use the highways both ways across the state. In the writer's opinion at least three highways through Knoxville will have to be prepared, three highways through Nashville, and at least two highways through Memphis; these to be connected with two highways lengthwise across the State from east to west. At least \$5,000,000.00 of expenditure will be required for their construction.

Haste should be made on a new bill for defense highways as it will require from 6 months to a year to get the work done.

HIGHWAY PRIORITIES ISSUED

DEFENSE highway work has been recognized by the Office of Production Management, Division of Priorities, by the issuance of priority ratings for certain kinds of highway construction work. Authority for the issuance of priority ratings was contained in a letter dated August 30, 1941, to Mr. Thomas H. MacDonald, Commissioner, Public Roads Administration. The letter was signed by Mr. E. R. Stettinius, Jr., Director of Priorities. Following is the letter:

EXCERPTS FROM OFFICIAL ORDER

It is considered important to the national defense to expedite the construction of highway projects conforming to the classes described below and administered by the Public Roads Administration and the several state highway departments. Accordingly, the Public Roads Administration and the state highway departments are hereby authorized in letting contracts and in obtaining materials and equipment necessary for the completion of these projects, for deliveries prior to June 30, 1942, to indicate to prospective contractors and suppliers that deliveries of such materials will, upon proper authentication and application, be assigned when necessary, the preference rating specified for the following classes of projects:

ACCESS ROADS

Access Roads to Military and Naval Establishments.—Preference rating of the access road project shall correspond to the rating of the military and naval establishment served; that

is, a naval air station or army air base will have a rating of A-1-e, and an army cantonment other than air corps will have a rating of A-1-j.

Access Roads to Defense Manufacturing Establishments.—Preference rating of the access road project shall correspond to the rating of the defense establishment served, except that the highest rating which can be assigned is A-1-e.

STRATEGIC NETWORK OF HIGHWAYS

a. All bridges, tunnels, structures and approaches.....	A-2
b. New roads or the improvement of substandard roads and grade separation structures	A-4
c. Shoulder widening and minor drainage structures.....	A-10
d. All other work	B-3

FEDERAL AID SYSTEM

a. All bridges, tunnels, structures and approaches.....	A-3
b. New roads or the improvement of substandard roads and grade separation structures	A-7
c. Shoulder widening and minor drainage structures.....	A-10
d. All other work	B-3

FEDERAL AID, SECONDARY AND NATIONAL PARK AND FOREST PROJECTS

a. Bridges and approaches	A-7
b. New roads or the improvement of substandard roads and grade separation structures	A-10
c. All other work	B-3

PROJECTS FOR THE CONSTRUCTION OR IMPROVEMENT OF THE INTER-AMERICAN HIGHWAY

Rating	A-3
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CONSTRUCTION OF THE TRANS-ISTHMIAN HIGHWAY AND THE CHORRERA-RIO HATO HIGHWAY IN PANAMA

Rating	A-1-b
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In letting contracts based upon the proposed assignment of the preference ratings indicated above, the Public Roads Administration and the several state highway departments may furnish contractors and suppliers photostatic or multilith copies of this letter.

If priority assistance is required in order to obtain deliveries of materials, supplies and equipment on schedule, an application shall be made by the state highway department concerned through the Public Roads Administration to the Project Section, Division of Priorities, Office of Production Management, for the issuance of a Preference Rating Order. If the circumstances set forth in the application warrant the assignment of a preference rating the Director of Priorities will thereafter issue a Preference Rating Order assigning the appropriate rating specified above to deliveries of material.

Each state highway department shall forward to this office monthly a list showing the names and addresses of all suppliers to whom a copy of this letter is furnished and the date when so furnished.

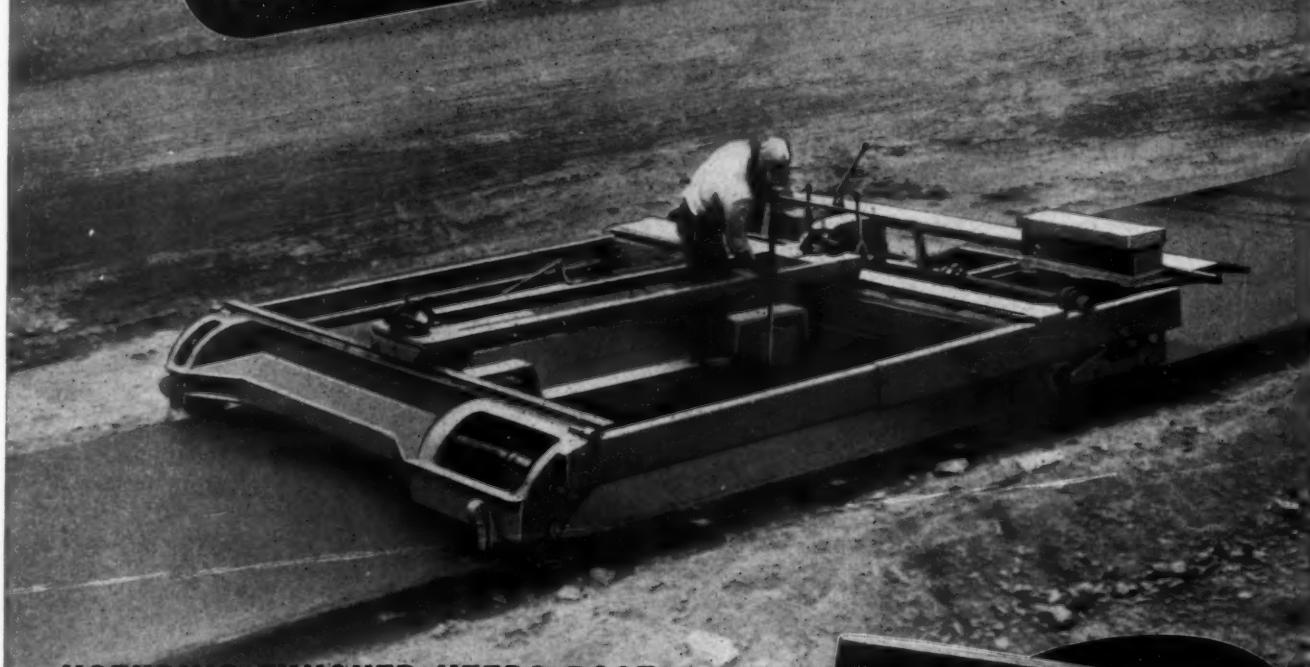
This letter may be recalled by the Director of Priorities whenever deemed necessary in the proper exercise of his duties and responsibilities.

APPARENTLY WRONG

ON PAGE 79 appears a "Letter to the Editor" from Director H. G. Sours of the Ohio Department of Highways. This letter refutes statements and deductions which might be made from an editorial published in last month's issue. The data for the August editorial were supplied by a usually reliable source and were not checked by the office. We wish to call attention to Director Sours letter. In it he states that no political pressure was brought to bear on the Ohio picnic. He says it was supported by civic organizations. We commend this type social activity and in our zeal to criticize political interference with highway engineering we apparently erred in publishing the August editorial.

The mistake in not carefully checking the data will cause us to be more critical of such information in the future but we will continue to attack political pressure and political interference in highway affairs whenever and wherever we find it.

ACCURATE FINISHING at Paver Speed



KOEHRING FINISHER KEEPS PACE ...with HIGH SPEED POURING

Accuracy and speed . . . that's what you get when you have a Koehring Longitudinal Finisher on your job. Finishing speed does not affect the accuracy. Various speeds are available to conform with the paver production speed. Accuracy is maintained to the last foot of pavement at the end of a long day . . . at any paver production speed. Because the Finisher operates equally efficient at varying distances behind the paver . . . finishing operation is possible after the initial set has occurred . . . and then there is no further variation of the surface. Speed is the present requirement . . . the Koehring Finisher can meet the required speed and still maintain the specified accuracy.

KOEHRING CO • Milwaukee, Wis.



Fully illustrated, new bulletin presenting complete information about Koehring Longitudinal Finisher now available. Write for it today.



HEAVY-DUTY CONSTRUCTION EQUIPMENT

SUGGESTED

CONTROL SECTIONS FOR A STATE SYSTEM OF HIGHWAYS

And Their Use in Statistical and Cost Records

By R. C. FALTINSON

Road Life Manager
Texas State-Wide Highway Planning Survey

MANAGEMENT of a highway department on a sound and efficient basis involves many problems, and one essential factor in the solution of these difficulties is the adoption, development, and use of good cost records. The every day work of construction and maintenance constantly develops new and useful methods so that it would not be far amiss to consider each section of road as an experimental project. The information on operation and costs properly recorded will furnish factual data that will permit comparison of construction and maintenance expenditures for specific sections and compare also the serviceability and salvage of previous expenditures.

The ideal cost record system should be sufficiently flexible to provide adjustments made necessary by changes in organization, policies, or laws, and be adaptable in principle for all highway organizations. Such a system will be of unquestionable value, and an analysis of these cost record data will reflect trends of progressive improvement in design and construction methods by road surface types.

Heretofore most state highway departments have maintained records embracing only the total expenditures of funds for construction and maintenance. It is impossible to determine from records thus maintained the present valuation of the existing usable part of a highway system. Further, from a study of such records it would be impossible to make an intelligent estimate of the amounts lost due to retirements—either through relocation, reconstruction, or actual abandonment, and through loss of investment by obsolescence; or to compute the annual roadway cost which is comprised of construction, maintenance, depreciation, and operation costs. Also it would be impossible to correlate construction costs with maintenance costs for a specified section of a highway because maintenance sections are usually consolidated, eliminated, or adjusted from year to year. Thus the limits of maintenance sections fluctuate from year to year and, in the course of time, lose their identity. This condition is probably prevalent in many state highway departments.

A comparison of construction and maintenance costs is helpful in determining serviceability of sections of road and salvage values when reconstruction is necessary, and management is handicapped by failure to obtain full knowledge of the results of past investments in road building. Another handicap occurs in the inability of one state to profit by comparison of cost records of other states. It is not meant by this state-

ment that the various state highway departments are not cooperative, but because of the lack of a uniform system of cost records they are unable to establish standards for the exchange of information based on similar pieces of property.

In establishing a system of cost records it is believed to be of utmost importance that the state system of highways be divided into sections, or separate pieces of property, with definite and unchangeable limits, and a designation or number that will never change even though the traffic route number may change. The data reflected on these records will form the basis for suitable statistical analysis as may be desired, as well as a control for surveys, plans, and other general routines.

It is desired to offer for consideration a Control Numbering System for state highways. The principles of this Control Numbering System provide for this division of a state system of highways into sections with fixed and unchanging termini. These established sections are to be identified by the term "CONTROL NUMBER". Subsections are to be established within the limits of each section and identified by the term "CONTROL SECTION". Each control section is to become a fixed piece of property and all expenditures made thereon are chargeable to the Control Section.

Definition of Terms

Control Number. A definite section of a highway route with well defined geographic termini. (A Control Number is comparable to any administrative or legislative route. However, a Control Number as used in this suggested numbering system is independent of a route or highway number and should always be independent of traffic route numbers.)

Control Section. A definite portion of a Control Number with well defined geographic termini within the established limits of a Control Number. A control number may consist of one or more Control Sections, and usually will consist of a number of such Control Sections.

Job Number. The Job Number assigned to each contract for construction within the limits of a Control Section.

Explanation of the Use of the Terms

A Control Number and Control Section Number once assigned must remain permanent for all time. Control Number and Control Section termini should be definitely fixed, and should not be changed under any cir-

No matter how TOUGH the Winter-

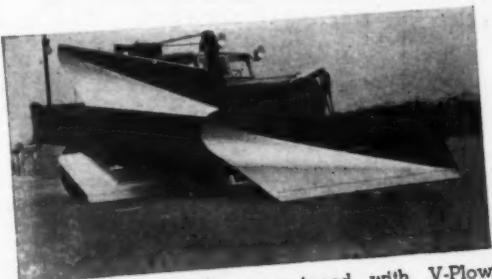
NATIONAL DEFENSE

demands **that you**

Keep the Roads Open!



Walter Snow Fighter with Rotary Plow, one of 21 in use by Canadian Royal Air Force.



Walter Snow Fighter equipped with V-Plow, Levelling Wings and Center Scraper.

With every minute vital to our defense preparations — losing days through snow-blocked roads and transportation tie-ups would be tragic. Defense materials, food, military supplies and troops must get through — and the Nation looks to you to clear the way.

You can depend on WALTER SNOW FIGHTERS to do the job — speedily, thoroughly, at low cost. Their 4-Point Positive Drive gives you four powerful driving wheels, with 100% traction in each, to blast through the deepest, heaviest snowdrifts without stalling — and to pull steadily on icy surfaces without slipping. This exclusive advantage results from a combination of Patented Automatic Lock Differentials — Suspended Double Reduction Drive — High Ground Clearance — Tractor Type Transmission and other construction features found only in WALTER SNOW FIGHTERS. Place your orders NOW to avoid possible uncertainties in future delivery. Write today for detailed literature.

WALTER MOTOR TRUCK CO.
1001-19 Irving Ave.
Ridgewood, Queens, L. I., N. Y.

WALTER

**4-POINT POSITIVE DRIVE
SNOW FIGHTERS**

The system outlined in this article is based on the system used by the Texas Highway Department. The Department of Highways in the State of Louisiana established this system in their reorganization of the state departments last year.—EDITOR.

cumstances except when relocation necessitates transposal of the previous Control Numbers or Control Section termini to a comparable point on the new location of the highway.

Average Lengths.—A control Number will usually cover the distance between the larger cities and towns. The distance may vary from 50 to 100 miles. The length of Control Sections will vary from 10 to 15 miles. The limits of existing projects will influence the establishment of termini of a Control Section. This will also hold true relative to the termini of Control Numbers.

New Control Numbers and Control Section Numbers can be assigned under this suggested system to provide for extensions of or additions to the state system of highways. It must be remembered, however, that for this system to function properly a Control Number and Control Section Number once assigned can never be subdivided nor be used again in case of abandonment of a section of road.

Each Job.—The Job Number is to serve as a permanent identification of each contract. No limits are fixed under the system for a particular contract within the limits of the Control Section, and as many Job Numbers may be assigned under a Control Section as there are different or successive contracts entered into. Job Numbers should be assigned in chronological order for the Control Section. A contract may be co-extensive with the full established Control Section, or it may be of shorter length within the Control Section limits. That is, there may be any number of contracts of varying lengths within an established Control Section, each contract or portion of a contract being assigned a separate Job Number. Portions of a contract which extend into

more than one Control Section will be assigned a separate Job Number independently in each Control Section.

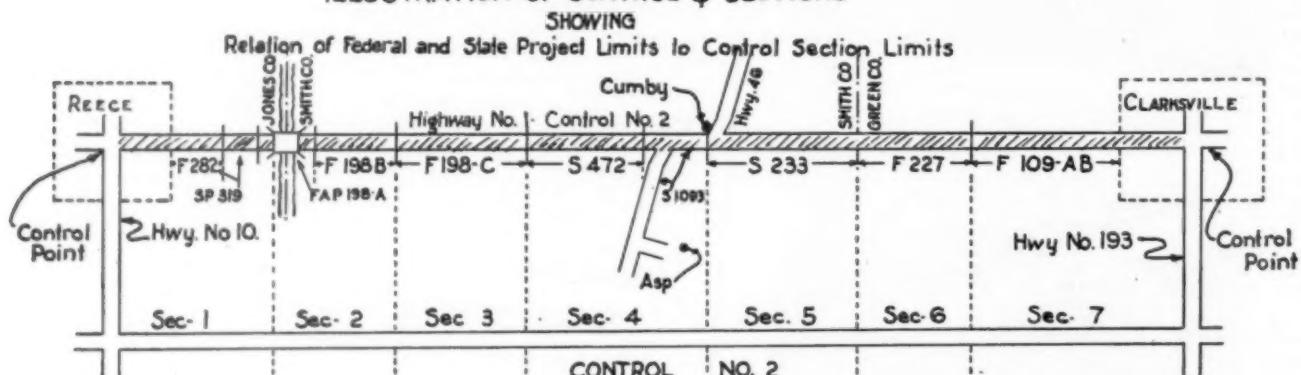
Adaptability.—Under this suggested Control Numbering System, (a) the present system of state project and section identification can be replaced by Control Number and Control Section; (b) day labor construction done by the state highway department field forces can carry the same Control Number and Section Number identification as do the contract job; (c) the maintenance section heretofore used for maintenance purposes can be replaced by one common Control Number and Section; (d) the bridge, underpass, and overpass identifications can be carried through to reflect on all construction projects, in addition to serving maintenance purposes.

Establishment Procedure

The method to follow in establishing this Control Numbering System set-up is this: One organizational division of the state highway department, possibly the engineering division, should be charged with the responsibility of establishing and maintaining state Control and Section Numbers, of mapping the state system of highways, of coordinating the system with the old project termini, and of preparing the cross-reference charts.

It is necessary that the highways on the state system be rated and grouped according to their relative importance to assist in establishing the route to govern where one route traverses another. In such instances where one highway traverses another for a distance, Control Sections should be set up in consecutive numerical order on the governing highway with a gap in the

ILLUSTRATION OF CONTROL & SECTIONS



CONTROL NO. 2-Hwy. No. 1

From Reece-Int. Hwy. No. 10-(Control 197-Sec. 3) To Clarksville, Junc. Hwy. No. 193-(Control No. 401-Sec. No 1)

CONTROL SECTION LIMITS

Sec. No.	County	Length	Description
1	Jones	12.832	From Reece-Int. Hwy. 10-(Control No. 197-Sec 3) To W. End White Cr. Br. At Smith Co. Line
2	Smith	5.372	From W. End White Cr. Br. At Jones Co. Line To End F-198-B
3	"	8.762	From End F-198-B To Beg. S-472(End F198C)
4	"	11.099	From Beg S-472(End F198C) Cumby-Center Line Courthouse
5	"	10.763	From Cumby(Center Courthouse) To Green Co. Line
6	Green	4.936	From Smith Co. Line To Beg. F-109-AB
7	"	14.200	From Beg. F-109-AB To Clarksville, Junc. Hwy. No. 193(Control No. 401-Sec. No 1)

FIGURE No. 1

The "99-M" Gives You... MORE WORKING WEIGHT



Figured in terms of live tractive weight, THE "99-M" IS THE HEAVIEST MOTOR GRADER ON THE MARKET

TO HANDLE MORE JOBS ... MORE PROFITABLY

- The "99-M" with its monorail frame enables you to breeze through jobs you wouldn't think of tackling with a conventional motor grader. This extra range of profitable usefulness is made possible by the "99-M's" extra tractive

weight provided by its distinctive All-Wheel Drive.

With powerful traction on all four wheels, plus steerable rear wheels, the "99-M" enables you to keep going in bad weather and soil that formerly meant costly time losses. In addition to saving time and money on both normal and extra difficult motor grader jobs, it profitably handles the work of two, three or more "part time" pieces of equipment.

Wherever heavy snow is a Winter problem any available "99-M" is in demand. It's rear steer nullifies side thrust by the wing; while extra working weight provided by All-Wheel Drive makes the "99-M" far more effective in "bucking" heavy drifts.

Ask for a demonstration!

THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois



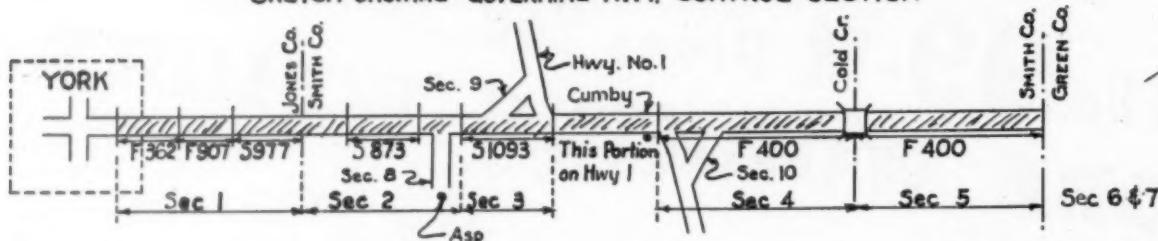
A motor grader without power on the front wheels is like a draft horse with roller skates on his front feet.

Motor Graders • Loaders
Blade Graders
Elevating Graders
Hydraulic Scrapers
Crushing and Screening Plants

Cable Scrapers
Rollers • Roll-A-Planes
Motor Sweepers
Bituminous Distributors
Shovels and Cranes

Austin-Western

SKETCH SHOWING GOVERNING HWY. CONTROL SECTION



CONTROL NO 200-HWY. NO. 46
From York (4th St & Ave A) To Smith Co. Line

CONTROL SECTION LIMITS

Sec. No.	County	Length	Control Section Limits
1	Jones	7.762	From York (4th St & Ave A) To Smith Co. Line
2	Smith	6.254	From Jones Co. Line To Beg S1093
3	"	7.156	From Beg S1093 To W. Junc. Hwy No. 1 (Control No 2-Sec.No.4) W. of Cumby.
4	"	4.872	From W. Junc. Hwy. No. 1 (Control No. 2-Sec. No. 5) E. of Cumby. To S.W. End of Cold Cr. Br.
5	"	9.246	From S.W. End Cold Cr. Br. To Green Co. Line
6			Not Shown on Sketch
7			
8	"	1.362	Spur To Asp.
9	"	0.116	"Y" Connection To Hwy. No. 1
10	"	0.238	"Y" Connection To Hwy. No. 1 Subsidiary Sections

geographical termini description on the secondary highway at points of entry and departure from the primary or governing highway. The beginning point of the gap in the secondary highway will be the ending point of a Control Section on this highway. Likewise the ending point of such a gap would be the beginning point of another Control Section on the same highway. This is illustrated in accompanying figures 1 and 2.

For discussion purposes, assume that Highway Number 1 will be blocked off completely across the state before another assignment is undertaken. By reference to the route maps or other records for Highway Number 1, it will be possible to establish definite termini for Control Numbers. Control Numbers should be assigned in consecutive order following the route of the highway from its origin to its termination. Control Section numbers should next be assigned in consecutive order under each Control Number. (See figure 1.) The number sequence should run from south to north and from west to east, or to fit existing conditions.

The present termini of the existing project sections will govern to a large extent the termini of a Control Section. Control Section termini should be established at the beginning and ending points of previously designated state or federal project limits. (See figure 1.) In this respect a Control Section may embrace one or more state or federal project sections.

By maintaining previously established federal project limits as termini for Control Section limits, the identification and entity of a federal-aid project is preserved. This tends to facilitate the functioning of various branches of a state highway department with the Public Roads Administration in regard to handling future construction of federal-aid projects. The basic unit will be in agreement so far as limits or termini are concerned with both the U.S.P.R.A. records and the Control Number system. Control Sections should terminate at some such point as county lines, intersecting routes, construction project limits, logical building units, and major stream crossings. It is desirable that the Control Section terminate at one end of any bridge, thus placing the bridge in only one Control Section. (See figure 1.)

Designation.—The manner of indicating Control and Control Section Numbers on records is illustrated below:

Con- trol No.	Sec- tion No.	County	Length	Control Section Limits
2	1	Jones	12.832	From: Reese Int. with Hwy. 10 (Control 197-3) To: West End of White Creek Bridge at Smith County Line

A pamphlet should be prepared for distribution to various organizational divisions of the state highway departments with the above information shown for all Control Numbers and Control Sections assigned on the highway system.

A construction contract within the limits of the above Control Section would be:

2-1-5, representing Control Number 2, Section 1, Job 5.

All previous construction should be fitted into the Control Section on which it was built and assigned Job Numbers in chronological order. On the same Control Section the maintenance section identity would be 2-1, representing Control Number 2, Control Section 1, along with type and other classifications desired.

Similarly, a construction contract on a bridge located within the limits of the above Control Section in Jones County and let under the same contract with the roadway work would be:

2-1-5, structure 67;
and maintenance thereafter on this bridge would be:
2-1, structure 67.

We are all acquainted with the general procedure followed in assigning federal-aid project numbers and sections. We realize that the system followed is not sufficiently elastic for the purpose of establishing fixed pieces of property for cost records. Federal-aid projects are designated with definite termini but occasionally these federal-aid projects may include one or more small project exceptions which necessitate later assignment of project section letters. The control numbering



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system establishes definite termini for a Control Section which includes the entire distance between the beginning and ending of the Control Section without any exception.

Interferences.—The question will probably arise as to whether this control numbering system will create any confusion or conflict with federal project number and section designation. The Control Number system does not involve any radical departure from old practices, and is very closely related to the federal-aid project designation. This relationship will be very evident for the reason that previously established termini for federal-aid projects, as well as for state projects, will control to a large extent the termini of Control Sections. Exceptional cases will be encountered where it is desirable to break Control sections within the limits of a federal project. However, in setting up a system of Control Numbers and Control Section Numbers these cases should be held to a minimum.

Advantages.—One of the principal points to be observed in establishing termini for Control Sections is determining what would be a logical building section in the future. Thus the Control Section when established would be of satisfactory limits on which to set up a project for future construction. The ideal arrangement thus striven for would be an accounting unit on which actual construction costs, accurate design data, and maintenance expenditure would be recorded. Also by establishing suitable Control Section limits for future building sections, a Control Section would eventually consist of one road surface type built as a unit, maintained as a unit, and in all probability, replaceable with

a new type as a unit. Thus the records maintained for this Control Section system could be correlated for statistical study. The records would permit comparison of annual roadway costs and yearly maintenance costs for similar road surface types. When a highway that has previously been assigned state Control Numbers and Section Numbers with fixed termini is taken on the federal-aid system, it would be desirable for the Public Roads Administration to coordinate its project designation with the previously established Control Section termini.

One of the advantages of this control numbering system is that it permits predetermination of control section termini and assignment of Control Section number prior to the initiation of a project, and the assignment of an account number (Control Section Number) for cost record purposes.

It will be noted on figure 2 that sections are set up for wye connections. This is for record only, as these sections are generally too small for an accounting unit. Charges for short wye sections should be included in the adjoining Control Section. If desired, however, a wye could be considered as a separate unit and records of expenditure maintained on such units.

Conclusion

The knowledge and observance of the principles of any system of this kind by the engineering and general field personnel cannot be over emphasized. Since the usefulness of the results obtained from cost records are dependent upon consistency and accuracy of the classification of charges which originate from work per-

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formed by engineers, it is important that proper recognition be given to the cost recording system principles in classifying and submitting the charges. In the control numbering system, wherein a Control Section becomes an account number or unit in the cost recording system, advantages will be derived from full cooperation of engineers in planning and building a Control Section as a construction unit where practical.

In conclusion it is desired to state in considering the vastness of the problems confronting highway administrators and engineers and their possible solution by any scientific system of highway cost records and its accompanying functions, there can be no doubt that complete cooperation and harmony must exist within and between the departmental agencies. The engineer, the accountant, and the statistician each has separate but closely interrelated tasks to perform and the development of sound and efficient highway policies depends on the manner in which each performs his duties, holding proper regard for the duties of others.

Letter to the Editor:

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
COLUMBUS

Mr. V. J. Brown
Publishing-Director
Roads and Streets
330 South Wells Street
Chicago, Illinois

Dear Vic:

On page 54 of the August issue of *ROADS AND STREETS* there was printed an article which concerns me greatly and which I feel should never have been published.

The article was "Political Interference Again." This article

to the person not acquainted with the facts would convey the idea that the Department of Highways in Ohio is primarily a political organization not doing efficient work and raises the question as to how much true engineering governs expenditures of highway funds in Ohio. This definitely is not true. I have worked hard here in Ohio to build up a high grade engineering department. I am not apologizing for the results. Anyone who wishes to acquaint themselves with the type of our engineering personnel, its morale and the quality of work which it produces would find that we have a progressive and well-trained engineering department in this state.

The article published, referred to a newspaper clipping concerning the sale of tickets for a state employees picnic. In my opinion newspaper articles of this kind should be carefully checked for facts before being used as a basis for criticizing a public department in a magazine of nationwide distribution.

The facts in this case are that the employees of the Highway Department along with some of the other state employees have sponsored picnics in several different sections of the state, usually including the counties in each division of the Highway Department. These picnics were open to the public and were very well attended. Various individuals and some of the civic organizations cooperated in publicizing them locally.

There naturally was some expense involved. State employees were given tickets and asked to sell them if possible. They sold what they could and returned the balance of the tickets and were under no obligation to pay for those which they did not sell. The tickets in the case of the Northern Ohio Picnic sold for ten cents each and were made up in \$1.00 books.

It was stated that employees were compelled to lose a day's time without pay. This again was not true. Our employees who are on an hourly rate work five days per week and in all cases where they lose a day during the five day period they are given the privilege of making up their time on another day.

All of these things were proven after the original article referred to appeared and we thought that the explanation had satisfactorily disposed of the matter. The picnics were not sponsored by political organizations as was indicated.

I am somewhat amazed now to see this type of stuff appear in a national magazine. We all know that one of our problems is to sell the public on the real need of highways and that, generally speaking, public officials are honest and trying to do a good job. Stories of this kind do not tend to build up faith and confidence



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of the people whom we try to interest in highways and it is my thought that extreme care should be taken before publishing matters of this kind.

This letter is blunt and to the point, but it is exactly the way I feel about it. It has taken years of my life to build up what I hope is a reasonably good reputation in the national highway picture and naturally stories of this kind are damaging. I have never been one to cringe when criticism is due me and I take the position that I do not hesitate to crack back at criticism which is not warranted.

There is no malice in my letter and I trust that you will understand it and take it that way. I have known you personally since the days we spent together in the same Company in the Army during the World War and I know that you would not intentionally do anything which would do me any personal injustice.

I would be pleased to hear from you and I do hope that the misunderstanding can be satisfactorily clarified.

Sincerely,

H. G. SOURS,
Director of Highways.
HGS/gew

WHY CONTRACTORS GROW FAT

AMIABLE rotundity or affable lankiness or the ever-happy medium—whatever the visible criterion of physical well-being and peace of soul—you can recognize it pretty generally in members of the Illinois Road Builders' Association. And one of the reasons for it is that these fellows know how to have a good time; and knowing how, also know who can properly handle the plans and arrangements and details of a day of recreation. Pity we don't have more days like the I.R.B.A. Round-Up at Elgin Country Club on August twelfth. We would live longer if we did.

Here, briefly are the features of the meet: golf, horseshoe, soft ball, barber shop music, poker, spike driving, clown band (main function to rattle nervous putters with anything from fanfare to funeral march), gravel guessing (there were 4,052 pieces in the jar, if you really want to know), informal prestidigitation on the lawn (had 'em all guessing—from colonels to caddies), jazz orchestra and floor show, lunch and dinner, and a proper and decorous amount of spirituous refreshment (this last at regular club prices).

Having absent-mindedly forgotten the editorial camera, we can not reproduce all of the jovial scenes that we should like, but herewith are some which have been kindly furnished by Mr. George C. Stewart of *Construction Digest*.

Prizes in the various events were awarded as follows:
Low gross—E. C. McAllister, Chicago—41-38-79.
Low net—Chas. H. Apple—88-25-63 (Peoria system of hand-capping).
Low gross (Guests)—P. J. Keller—39-41-80.



Some of the Officers and Committee Members Who Made the Round-up a Success

Longest drive—W. W. Wolf, Chicago—290 yards.
 Low nine holes—R. K. Stiles, Aurora.
 Second low nine holes—Rep. Arthur W. Sprague, La Grange.
 Blind bogey—H. G. Sporel, Oak Park.
 Guessing contest—Number of pieces of gravel in bowl—V. H. Kasser, Elgin.

Horseshoe pitching—C. W. Arnold, Division of Highways, District 10, Chicago.

Closest to cup on short hole—Philip J. Harrington, Chicago.

In addition to these first prizes, a large number of second and third prizes were given, and a goodly number of door prizes.

The trophies, as well as all special entertainment, were the gift of the associate members—a generosity deserving mention by name:

A-W Equipment Co.
 Alpha Portland Cement Co.
 American Bonding Co. of Baltimore
 American Manganese Steel Division
 American Steel & Wire Co.
 Anderson Sand & Gravel Co.
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 Robert W. Baker
 Barber-Greene Co.
 Walter H. Brinkman
 F. H. Burlew Co.
 Ceco Steel Products Corporation
 Chicago Gravel Co.
 O. T. Christerson Co.
 Consumers Co.
 Dewey Portland Cement Co.
 Elmhurst-Chicago Stone Co.
 H. B. Faith Equipment Co.
 Fidelity & Deposit Co. of Md.
 Walter H. Flood & Co.
 Fruehauf Trailer Co.
 Gar Wood Industries, Inc.
 Joseph L. Gill & Co.
 Great Lakes Asphalt & Petro. Co.
 Great Lakes Supply Corporation
 Highway Steel Products Co.
 C. H. Hoppe Foundry Co.
 Horan & O'Brien
 Illinois Corrugated Culvert Co.

Early golfers arrived at the club at 9:30, from which time on, traffic increased till noon. Total attendance 410 (contractors, manufacturers, dealers, distributors, highway officials and guests) : golf entries 176. Weather too good to be true. Gang broke up about midnight after speeches and entertainment and the award of prizes. Everybody happy with what he got or failed to get.

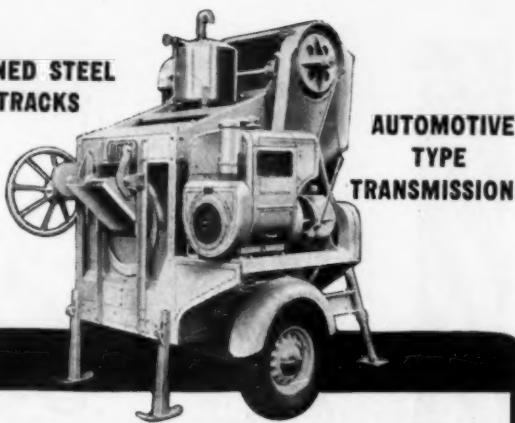
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Chairman, Comm. on Prizes—Walter R. Leininger, Leininger Construction Co.

Chairman, House and Guest Comm.—I. H. Buchman, State Highway Dept., Dist. 1.

Chairman, Golf Comm.—Robert H. Tittle State Highway Dept., Dist. 1.

Chairman, Dinner and Luncheon Comm.—H. A. Leach, Illinois Hydraulic Stone & Construction Co.

Chairman, Comm. on Caddy Arrangements—W. R. Meadows, W. R. Meadows, Inc.

Chairman, Comm. on Sports and Pastimes—Arthur Giertz, Charles E. Giertz & Son.

Also, actively cooperating with the committee were Pres., Otto A. Milburn; Executive Sec'y, Taylor G. Soper, and other officers and directors of the association.

OFFICIAL U. S. DELEGATES TO FOURTH PAN-AMERICAN HIGHWAY CONGRESS

The Department of State has released the list of delegates for the Fourth Pan American Highway Congress to be held in Mexico City Sept. 15-24, 1941. Besides the following list of official delegates there will be a large number of associate delegates from the American Road Builders Association as well as a large representation of American manufacturers.

Delegates:

Josh Lee, Senator from Oklahoma, *Chairman of the Delegation*.

Wilburn Cartwright, Representative from Oklahoma.

Luther A. Johnson, Representative from Texas.

Jesse F. Wolcott, Representative from Michigan.

Edwin W. James, Chief, Division of Highway Transport, Public Roads Administration.

William F. Machold, Assistant Director, Commercial and Financial Division, Office of the Coordinator of Inter-American Affairs, Office for Emergency Management.

John Van Ness Philip, Member, Pan American Highway Finance Committee.

Hal G. Sours, President, American Road Builders' Association, Columbus, Ohio.

J. S. Williamson, President, American Association of State Highway Officials, Columbia, South Carolina.

Technical Advisors:

John Abbink, President, Business Publishers' International Corporation, New York, New York.

Wainwright Bridges, Clerk, Committee on Roads, House of Representatives.

Roy W. Crum, Director, Highway Research Board, National Research Council.

Raleigh A. Gibson, First Secretary, American Embassy, Mexico City.

Stephen James, Director, Pan American Highway Confederation.

Barton P. Root, Public Utilities Unit, Bureau of Foreign & Domestic Commerce, Department of Commerce.

Charles M. Upham, Engineer-Director, American Road Builders Association.

Secretary:

Morris N. Hughes, Consul, American Consulate General, Mexico City.

Assistant Secretary:

Miss Hanna Cabrera, Public Roads Administration.

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ABOUT CONTRACTORS and their JOBS

MICHIGAN AREA

Reported by
J. M. TELFORD

Airport Work. — With the current highway construction program temporarily somewhat uncertain because of priority difficulties work on two huge airport runway surfacing projects has occupied the lion's share of the construction spotlight in Michigan recently.

The Detroit Asphalt Paving Company has set up what is believed to be the world's largest asphalt plant at Kellogg airport,

adjacent to Fort Custer near Battle Creek. Actually, the layout involves three ordinary plants, have a total capacity of 210 tons of bituminous materials per hour. The contract calls for about 400,000 square yards of bituminous concrete surfacing, which will require 120,000 tons of material laid in a 4½-inch base course and a 1½-inch wearing course.

In addition to the three plants, equipment on the job includes a Jaeger, a Barber-Greene, and two Ord finishing machines, eight gas and diesel tandem rollers of 8 to 12 tons rated capacity, and one 3-wheel Austin-Western Rollaplane. Stor-

age capacity for 75,000 gallons of asphalt is provided.

The largest concrete paving contract ever let in Michigan will result in laying approximately 750,000 square yards of concrete—the equivalent of more than 60 miles of standard pavement—at the Ford bomber airport near Ypsilanti. Several dual drum machines will be used on this job, which will be done by Julius Porath & Son of Detroit, associated with Lewis and Frisinger of Ann Arbor and E. B. Schwaderer of Cass City.

Low Bid for Causeway Received. — Johnson & Greene of Whitmore Lake were the low bidders on construction of the proposed 4,085-foot causeway that will extend into the Straits of Mackinac from the Upper Peninsula of Michigan. The causeway, which someday may be a part of a bridge across the Straits, will serve as the northern terminal of the state-operated ferries, and will cut the ferry run from the present nine miles to about three miles. Quantities include 63,600 tons of 10-ton minimum quarry stone, 10,600 tons of 5-ton minimum quarry stone, 19,500 cubic yards, of 1- to 5-ton selected borrow rock or 29,300 tons of 1- to 5-ton quarry stone, 217,000 cubic yards of borrow rock, 122,300 cubic yards of borrow earth, 193,100 cubic yard miles of earth and rock overhaul, and a 90-foot bridge to allow passage of small vessels. The bid price was \$616,000. Later contracts will provide for a ferry dock at the end of the causeway.

Dickinson County Engineer Appointed. — M. C. Connolly, who has been associated in various engineering capacities with the State Highway Department since 1934, has been appointed engineer and superintendent for the Dickinson County Road Commission to succeed James C. Clulo, resigned.

Work Started. — The Weir Construction Company of Detroit has started work on its contract to construct the south service drive adjacent to the proposed Davison Limited Highway in Highland Park, for the Wayne County Road Commission.

Miscellaneous News. — Frank McCowan, for ten years office engineer with the Ingham County Road Commission, resigned to join the engineering staff of the Lansing Electric Light and Water Board.

The City of Iron Mountain has taken delivery on a new Austin-Western street sweeper.

John Watson, 64, chairman of the St. Clair County Road Commission, died at his home in Port Huron August 5.

KANSAS CITY AREA

Reported by

PAUL L. MATCHETTE

More Defense Work. — Fort Leonard Wood, Missouri, has awarded several more contracts for roads, streets, and parking areas. These have just recently been awarded:

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Tobin Quarries, Inc. Kansas City, Mo.	1½" Hot Mix Asphaltic Concrete plus 3" additional crushed stone base for parking area.	212,000	1.18
Odell & Riney Hannibal, Mo.	2" Bituminous Mat State Highway Type employing graded aggregate and MC cut-back.	192.00	0.57
Koss Construction Co. Des Moines, Iowa	Light Type Surface approximately 1" Thick thick, "inverted penetration type," and prime and surface seal.	421,700	0.297

Granite Bituminous Company are shipping in a Warren Brothers asphalt plant and a Barber-Greene finishing machine. Tobin Quarries, Inc., are shipping in a new Barber-Greene central asphalt plant and finishing machine. Odell and Riney will do their job with blades and graders. Koss Construction will also use blades and graders.

Major H. M. Brock, in charge of lump sum contracts, will be in charge of this work. Jack Edwards, assisted by E. L. Staubyn, asphalt inspector, will check the asphalt plants and finishing machines and see that the work is according to specifications. Chet Roweth, of Tobin Quarries, Inc., who is vice-president and general superintendent, has installed a large crushing plant that will furnish stone for the hot asphalt jobs. Mike Curran, of Odell and Riney, will supervise the bituminous mat job.

New Work to Approximate 500 Miles of Pavement.—The Tri-State district, including Missouri, Kansas, and Oklahoma, and part of Arkansas, is very fortunate in obtaining a number of defense projects. These are reported as follows:

Powder plant near Choteau, Okla.	\$51,000,000.00
Amonia nitrate plant near Baxter Springs, Ks.	18,000,000.00
Shell loading plant near Parsons, Kansas	39,000,000.00
Army camp near Neosho, Missouri	20,000,000.00
Army camp near Braggs, Oklahoma	20,000,000.00
Army camp near Ft. Smith, Arkansas	20,000,000.00

Besides all of the above projects requiring roads and streets, it is reported that they all will be equipped with airports. All totaled, it is estimated that a paved yardage amounting to approximately 500 miles of 20 ft. road will be required to take care of the paved surface for these projects.

Entertains Contractors.—Charles Hulme, a well-known and liked contractor and aggregate producer, of Great Bend, Kansas, entertained all of the boys attending the Great Bend road letting August 13 at a Dutch Lunch in the Elks Club. Charlie Hulme is a great hunter and fisherman. He brings in wild game from Colorado and west Texas, and does a considerable amount of fishing in the Gulf of Mexico. Charlie keeps a well-filled larder at the Great Bend ice plant.

Charlie entertained all of the contractors material men, bond men and machinery men. In sending out the invitation, due to past experience, he requested that the bond

men bring their own soft drinks. This included Jerry Higgins and Bill McCarthy, two of the highest powered bond men in the southwest, especially so after using 3.2 beer as a chaser. Kansas is a dry state.

R. B. Wills Is Recovering.—R. B. Wills, chief highway engineer, Kansas State Highway Commission, has just returned from the Mayo Clinic at Rochester, Minnesota. Mr. Wills underwent an operation the forepart of August for a ruptured blood vessel. We know that all of his friends will be pleased to learn he is getting along in fine shape. We are all very fond of Mr. Wills, and we wish him a speedy recovery.

Kansas Contractor Has Heavy Schedule.—M. W. Watson, National president of A. G. C., is a Kansas contractor with headquarters at Topeka. Mr. Watson is perhaps one of the most active men in the construction industry throughout the south-

Acres of SISALKRAFT



335 blankets, 13'-6" x 100', were used on this soil cement job at Windsor Locks for protection and curing. Contractor put in 86,000 square yards in 11 days. Peak day — 16,241 yards! Practically all the blankets — 10 acres of them! — appear in this photo. Contractor will re-use these same blankets on three other similar jobs.

PROTECTIVE COVERS . . . ROLLS

Tough, waterproof, airtight Sisalkraft is the economical answer to all Protection needs. Designed, Tested, Proved in the field, SISALKRAFT is the perfect combination of utility and research. The asphalt layers give it waterproofness . . . The wire-tough Sisal fibres impart unbelievable strength . . . The specially treated kraft brings scuff resistance and high wet strength. It's Precision Built!

Sisalkraft has "what it takes" for rough use and long service in the toughest job paper is called upon to perform. Keep a few rolls and

covers handy on every job — there's a size to fit every need, at a fraction the cost of canvas! Our distributors have good stocks on hand — ready to serve you. Phone or write them today.

The SISALKRAFT Co.

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SAN FRANCISCO - 55 New Montgomery St.



west. Last winter and spring, associated with John C. Long, of Kansas City, and Manhattan Construction Company, of Muskogee, Oklahoma, Mr. Watson built Camp Funston an Army camp in connection with Fort Riley, Kansas.

Besides doing a considerable amount of paving work, Mr. Watson operates a large organization in Kansas, building Kansas highways. He also maintains an office in Austin, Texas. He does a great deal of city paving, and is a large operator in the building industry. As president of the National A. G. C., Mr. Watson and Mr. H. E. Foreman, managing director of National A. G. C., are endeavoring to attend meetings of most of the A. G. C. chapters throughout the United States. This is a real undertaking in itself. In August they

made a swing through Denver, Salt Lake City, Portland, Oregon, Seattle, Washington, Boise Idaho, and Butte, Montana. The fine work M. W. Watson is doing in the Association, is greatly appreciated, not only by the contractors, but by the men in the different industries associated with the contractors.

Five Million Dollars Allotted.—The Enid, Oklahoma Airport has been allotted approximately five million dollars. This airport will house a flying school similar to Randolph Field, Texas. Tankersley Construction Company, and Trapp of Oklahoma City are the general contractors. Moran & Buckner of Muskogee, Oklahoma, and Jack Briscoe, of Stillwater, are grading and laying the concrete runways. W.



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**EQUIPMENT
FOR EARTH MOVING
ROAD MAINTENANCE
AND SNOW REMOVAL**



D. "Brownie" Amis is working with Jack Briscoe on the dirt. Both E. W. Baker & Company, of Bethany, and Asplund Construction Co. of Enid, are digging trenches for drainage.

ST. LOUIS AREA

Reported by

O. B. AVERY

State of Missouri to Plan Defense Roads.—Members of the State Highway Commission decided at their monthly meeting to go forward with plans for the construction and improvement of roads in the vicinity of the army camps and other defense projects in Missouri, on the belief that federal funds would become available as the result of the introduction of the new congressional bill appropriating \$125,000,000 for defense highways. Under this new measure, which was offered after President Roosevelt vetoed a previous proposal, Missouri would be apportioned \$2,135,000 with \$3,116,709 remaining as an unobligated balance of previously apportioned federal aid funds.

Recent fatalities in traffic accidents in the vicinity of Fort Leonard Wood and at other military and defense projects, emphasize the urgent need for improved traffic ways. Highway officials said the department would have \$2,000,000 above the amount needed for its regular program which would be available for matching such additional federal aid for defense roads as may be allotted.

Highway 66 Widening Survey Is Started.—Missouri State Highway Department engineers have begun a preliminary survey for the proposed widening to four lanes of a five-mile stretch of U. S. Highway 66 from Vandover Road to the bridge across the Meramec River at Times Beach. The three-lane road has frequently been the scene of fatal accidents and has been called the most dangerous road in St. Louis County. The work has been designated as a strategic project under the defense program. Bids probably will be called for this fall.

Highway engineers have also started marking No. 66 over its entire length of 300 miles in this state with new reflectorized no-passing zone yellow barrier stripes. The new type of paint, visible at night, is expected to reduce night-time accidents.

City of St. Louis Revives Contract Plan for Street Work.—The city government has definitely abandoned the policy of street construction by city-hired labor, and will return to the system of private contracts with competitive bids. This was announced by Charles H. Ellaby, President of the Board of Public Service. Ellaby said the abandonment of plans for a new asphalt plant at the City Workhouse was in line with the new policy.

No large street construction or resurfacing jobs are now pending, but such jobs may result from the prospective replacement of street cars by buses on several lines of the Public Service Co. In some such cases, the city has resurfaced with an asphalt and limestone mixture over the rails. In some streets, the foundation might need replacing and the Workhouse plant,

designed to use larger sizes of limestone than the existing asphalt plant, was planned to provide for such cases.

Contracts Awarded and Low Bidders on Missouri Work.—Low bidders at the

Contract was awarded to George W. Condon and Peter Kiewitt, Omaha, Nebr., covering track work (approximately 2,300,000 cu. yd. of grading) in Northern Missouri by the Chicago, Rock Island & Pacific Railroad Co. Construction of new steel bridge was awarded to Alexander & Repass, Des Moines, Iowa.

Among those to whom contracts were awarded by the Missouri State Highway Department at the July 25th letting were the following:

Fred M. Clark, Louisiana, Mo., 4.720 miles of culverts, bridge surfacing in Buchanan County—\$34,162.00.

Hoover Bros. Construction Co., Kansas City, Mo., 1.231 miles of grading, bridge surfacing in DeKalb County—\$19,990.00.

Otto W. Knutson, Kansas City, Mo., 2.228 miles of grading, bridge surfacing in Macon County—\$20,638.00.

Cameron-Joyce Co., Keokuk, Iowa, 9.539 miles of grading, bridges and 22' concrete paving in Randolph County—\$74,829.00.

Ray & Son, Inc., Louisiana, Mo., 3.049 miles of grading and surfacing in Monroe County—\$19,511.00.

Ray & Son, Louisiana, Mo., 0.640 miles of grading and surfacing in Shelby County—\$30,206.00.

Cameron, Joyce Co., Keokuk, Iowa, 12.611 miles of grading bridges and 22' concrete paving—\$556,148.00.

Neyer Construction Co., Billings, Mo., 9.241 miles of grading, aggregate clay stab, bituminous surfacing in Christian County—\$157,905.00.

Globe Construction Co., Kansas City, Mo., 1.288 miles of grading, surfacing in Laclede County—\$10,490.00.

Ray & Son, Louisiana, Mo., 3.445 miles of grading, gravel in Powell County—\$16,674.00.

Koss Construction Co., Des Moines, Iowa, 2.017 miles of 22' concrete paving in Wayne County—\$58,513.00.

PITTSBURGH AREA

Reported by

JOHN W. PATTERSON

Pennsylvania State Highway Department Carries On.—The State of Pennsylvania in September will award some of the largest road projects in 1941. The largest single project will be the Butler County job which is covered as follows:

BUTLER COUNTY Legis R-73 Sec. R-4 Legis R-73 Sec. R-5 T.R.8 Center, Clay and Brady Twps. LENGTH: 28,247 equals. Schedule 1. 22,650 equals Schedule 2. Construction on R-73, Sec. R-4—reinf. conc. pvtmt. 34', 24' and variable in width, including construction of 4 reinf. conc. arches and for construction of Route 73, Sec. R-5, reinf. conc. pvtmt. 24' wide, including construction of 4 reinf. conc. arches and construction of 3 reinf. conc. bridges.

Project begins at a point approximately 1.6 miles northwest of the Butler City line and runs in a northwesterly direction for a distance of approximately 5 miles—

Schedule 1. Project begins approximately 1.2 miles north of Unionville and extend in a northwesterly direction to a point near the village of Stone House—Schedule 2. The amounts of certified check to accompany the proposal are:

\$7,500.00 (Schedule 1)
\$7,000.00 (Schedule 2)
\$7,500.00 (Schedule 3)

APPROXIMATE QUANTITIES

SCHEDULE 1

699,588 cu. yds. class 1 excavation
3,931 cu. yds. class 2 excavation
2,496 cu. yds. borrow excavation
15,308 sq. yds. cr. agg. base course
325 cu. yds. selected material surfacing
16 square yds. plain cem. conc. pavement

76,466 sq. yds. cem. conc. pavement
76,466 sq. yds. reinforcement in cement concrete pavement

Either

405 tons bitum. surf. course HE-1 (Stone)

or

353 tons bitum. suf. course HE-1
11,825 sq. yds. bitum. surf. course. AT-1 (Slag)

1,203 cu. yds. class B concrete
44,699 lbs. plain steel bars
12,331 sq. yds. plain cem. concrete gutter

SCHEDULE 2

481,661 cu. yds. class 1 excavation
3,987 cu. yds. class 2 excavation
3,670 sq. yds. cr. aggregate base course

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HORIZONTAL DRILLS



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In the Coal field, the Iron range, the Utility and the Contracting field.

We build a model for every need.

Parmanco Drills are now in their fourth year of successful operations.

WRITE US YOUR DRILLING PROBLEMS

PARIS MANUFACTURING CO., INC.

PARIS, ILLINOIS

435 sq. yds. selected material surfacing
 61,267 sq. yds. cement conc. pavement
 61,267 sq. yds. reinforcement in cem. conc.
 pvmnt.
 354 sq. yds. cem. conc. wear, surf. for
 bridge floors
 2,223 lbs. plain structural steel
 354 sq. yds. reinforcement in cem. conc.
 wearing surf. for bridge floors
 3,241 sq. yds. bitum. surf. course AT-1
 200 cu. yds. class A concrete
 2,042 cu. yds. class B concrete
 118,231 lbs. plain steel bars
 1,690 sq. yds. plain cem. conc. gutter

Ten other projects involving approximately thirty miles of highway will go to the contractors in September for completion over the next year. The State of Pennsylvania has many vital defense in-

dustries, much producing farm land and a population of 10,000,000. This all rates sufficient arteries of transportation, and the highway department of Pennsylvania is doing everything possible not only to take care of this great state from a standpoint of additional necessary highways, but more efforts are being put forth, and great progress is being made to maintain and keep in excellent shape Pennsylvania's entire highway system.

Moon Township Airport Going Up.—Brig. Gen. Donald H. Connolly, head of the Civil Aeronautics Administration, announced on August 1st allocation of \$80,810,110 of the total of \$94,977,750 appropriated by Congress for civil airport construction for fiscal year starting July 1.

On 216 of the 318 projects, work will be done by contract with bids to be called for within 60 to 90 days; 87 will be done by WPA and 15 by a combination of contract and WPA.

Lt. Col. Lucius D. Clay, Corps of Engineers, c/o Aeronautics Administration, Commerce Bldg., Washington, D. C., will direct the work.

MONTANA AREA

Reported by
L. E. JONES

The Montana Highway Commission on August 21, 1941, awarded contracts totaling \$510,561.36 on nine highway and bridge projects. Projects and successful bidders were:

1. Construction of four small bridges and two stockpasses on Baker-Webaux Road, D. M. Manning, Hysham, \$14,494.58.
2. Regrading and Oil surfacing Chirook-Malta Roal, Nilson-Smith Construction Co., Great Falls, \$47,583.94.
3. Regrading and oil surfacing Glacier Park Trail, Rooseneet County, Collison and Dolven, Billings, \$135,335.16.
4. Seal Coating, Miles City, North Dakota line highway, Nolan Bros., Billings, \$26,183.48.
5. Grading and surfacing, Libby-Jennings Road, Carl Nyberg, Yardley, \$139,292.13.
6. Regrading and oil surfacing, Lewistown, Grass Range Road, Collison and Dolven, Billings, \$89,728.88.
7. Gravel surfacing, Fort Bertan, Gualdine Road, Nilson-Smith Construction Co., Great Falls, \$14,552.08.
8. Grading and surfacing, Great Falls, Highwood Road, Nilson-Smith Construction Co., Great Falls, \$18,618.75.
9. Gravel surfacing, Coal strip, Lame Deer Road, Collison-Dolven, Billings, \$15,475.00.

The next highway letting arranged by the Montana State Highway Commission is scheduled for September 30, 1941, when 13 projects will be up for bid.

The Montana Contractors Association summer meeting and party held at Boulder Hot Springs on the afternoon and evening of August 20, 1941, was attended by approximately 175. The business session held in the afternoon was presided over by W. P. Roscoe, President of the Montana Contractors Association. Very interesting discussions were presented by Mr. M. W. Watson, President of A.G.C. of America, Topeka, Kansas. Mr. Watson's subject, "The Present and Future of Highway Contractors." Dr. H. E. Foreman, Executive Secretary of the A.G.C. of America with offices in Washington, D. C., discussed his subject, "Through the Washington Keyhold." Major Selee, U. S. Army Engineer, Fort Peck, Montana, discussed "Future Airport Development for Montana." James H. Row, President, Montanans, Inc., Butte, told of the work of his association and discussed the relationship between the contractor and the public. The business session closed with a Round Table discussion presided over by J. L. McLaughlin, District Director of A.G.C. of America, Great Falls. The banquet, with Lester H. Loble, Helena, as toastmaster, was a high light. Dancing followed.

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BITUVIA ROAD TAR

Because of construction and maintenance economies and because of its traffic safety BITUVIA road tar construction offers distinct advantages to the contractor and to the public. Deep penetration holds the aggregate firmly for long service. BITUVIA is easily applied. It is highly resilient and skid-resistant. Made in seven types to meet any Federal, State, County or Municipal specifications.

PLASTUVIA CRACK FILLER

The unusual ability of this filler to withstand a wide range of temperatures—from bitter cold to torrid heat—without flow or traffic “pull” in summer, or chipping in winter, makes it an outstanding product. The ease with which it is applied, and the manner in which it holds tenaciously to concrete and brick surfaces characterize this material. Your inquiry will bring you further information about these products.

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 FIFTEEN PLANTS TO SERVE YOU

EQUIPMENT AND MATERIALS

Blaw-Knox Improves Finisher

Blaw-Knox Company, Blaw Knox, Pa., has improved its gasoline-driven finishing machine, introducing new features designed to provide the greatest flexibility of operation. According to the manufacturers the improvements in this new "Model XB" finisher are provisions for six traction and four screed speed that provide for all



practical purposes, a universal combination which will accommodate any texture of concrete or any type of paving work.

The new finisher is equipped with power operated hydraulic screed lifts. The same type of hydraulic lift is applied to the vibrator when the finishing machine is equipped with one.

The six traction speeds, covering both forward and reverse operation, include four working speeds and two travel speeds.

An automotive unit type of transmission controls all functions of the finisher, including traction, screed operation, belter, and tamper or vibrator. The traction wheels now have removable rims to facilitate adaptation from one type of paving work to another, and there is special wheel equipment for multiple lane construction of airport runways and aprons.

Included in the new model is an entirely new design of spring steel wheel cleaners, which now extend to the horizontal center line of the wheels where they can do a more thorough job of cleaning. The crank drive for the screeds has been changed from bronze bushed bearings to self-aligning ball bearings.

Moulded Fabric Bearings for Cranes

The Gatke Corporation, 228 N. La Salle St., Chicago, announces development of special Moulded Fabric Bearings for crane track wheel, trolley, and line shaft service.

It is claimed that these special fabric bearings give extra long service, have very low friction—either starting or running, and that they will not score journals even if lubrication fails.

The manufacturer further states that these bearings withstand shock and impact peculiarly well; that they are non-corroding, even in strong fumes; and that in actual service they have stood up under surprising conditions of dirt and neglect.

New 16-page Catalog sent on request.

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...with Brooks
LOAD LUGGER**

You can't beat this multiple body dump truck system for a low-cost method of moving materials on any kind of road building or repair work . . . wherever loading is done by hand labor. Sewer jobs, garbage hauling, snow removal and waste disposal, are typical of its many applications. Tilt-type or open-end buckets, and special refuse containers are available for various jobs.

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GRUENDLER COMPLETE ROCK CRUSHING PLANT, SET-UP

Proper Size Aggregates when and where you want it with Gruendler Portable Crushers

Where the rock is hard and the going is tough—where large production is required at low operating costs and little upkeep
—Better Select a GRUENDLER UNIT.



Four Wheel Maintenance JAW CRUSHER with Power Unit for easy mobility to and from the job.

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NATIONAL DEFENSE DEMANDS:

- 1. Proven Materials**
- 2. Speedy Construction**

- 3. Lasting Durability**
- 4. Sound Economy**

COLPROVIA ASPHALT SURFACE MIXTURES for Airports and Roads Preeminently Meet These Demands!

1. PROVEN MATERIALS: Over ten years service under all traffic conditions has proven the merit of Colprovia mixtures. They have been used in increasing volume by federal, state and local authorities.

2. SPEEDY CONSTRUCTION: Colprovia mixtures are manufactured, by both cold and heated processes, at modern local plants of large capacity. They are easily and quickly spread in all seasons of the year by means of standard spreading devices or by hand to a perfect surface without joints.

3. LASTING DURABILITY: Colprovia surfaces are permanent — not

temporary. They have been recognized as the standard dense cold-laid pavement for many years. They are non-skid, stable, and are not affected by climatic conditions.

4. SOUND ECONOMY: Colprovia surfaces are not expensive in initial cost. They are laid with minimum expense and give maximum spread per ton. They are not to be compared with temporary materials, the maintenance of which will be a burden to the taxpayer after the emergency is past. Most communities can save money by specifying asphalt mixtures made by Colprovia processes for every paving requirement.

Consultation with Engineers on All Paving Problems Invited

COLPROVIA ROADS, INC.

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SELF-LOCKING
NUT THAT
SAFEGUARDS
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RESILIENT

GRIP of its non-metallic locking collar holds nut tight under any vibration.

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2357 VAUXHALL ROAD • UNION, NEW JERSEY

Clasic Stop SELF-LOCKING
NUTS

OSGOOD



TYPE 20

the biggest value in the $\frac{1}{2}$ cu. yd. class. Available as shovel, crane, dragline, etc., on crawler, truck or pneumatic tired wheelmount.

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and Specification.*

THE OSGOOD CO.
MARION OHIO

Gatke Fabric Crane Bearings are moulded to finished dimensions in all shapes and sizes to fit exactly the same conditions and spaces as conventional bearings.

New Close-Corner Air Drills Announced

Developed to cut the time required for heavy duty close quarter work, the No. 377 Class Rotary Pneumatic Close Corner Drills, Non-Reversible and Reversible types, are announced by the Independent Pneumatic Tool Company.

According to the manufacturer time saving with the No. 377 is directly achieved in work output due to surplus power delivered by the rotary motor and the compact design and strong construction.

International Introduces 5 New Heavy Duty Trucks

Features of five new heavy-duty truck models now being shipped from the International Harvester works at Fort Wayne, Indiana, include new styling; new car comfort; new foam-type, sponge-rubber seat cushions; easier steering; improved frame construction; longer, easier riding springs; new rubber-mounted propeller shaft center bearings; wider and tapered front cross-member; new and important engine features; and Hi-Tork hydraulic brakes.

A New Paving Breaker

Ingersoll-Rand Company announces a new 60-pound class "cushioned-air" paving breaker known as the CC-60. This tool is for hard clay, shale, brick, concrete, or for jobs where it is not feasible to use a heavier tool. It is reported that the ease in handling this tool comes from an air cushion which absorbs the blow of the piston when the steel is not in contact with the work. Although developed as a light-weight easy-handling tool, the CC-60 because of its hard hitting blow makes a fine machine for all-around paving breaker work.

Ingersoll-Rand Company has published a new booklet, Form 2768, giving more details concerning this new paving breaker. For further information address Ingersoll-Rand Company, 11 Broadway, New York, N. Y.

New Concrete Bucket

Blaw-Knox Co., Pittsburgh, Pa., has developed a roller gate concrete bucket which will receive a concrete charge either in upright position or lying down. This bucket, known as the Hi-Lo charge model, has a receiving hood and skids. These attachments permit laying the bucket down to receive its full rated load from a truck mixer. When lifted, the bucket assumes its normal upright position for discharge. The Hi-Lo bucket is available in 1, 1½ and 2 cu. yd. sizes. The Hi-Lo attachments by which a standard Blaw-Knox roller gate concrete bucket may be converted to a Hi-Lo charge model, are also available for these same sizes. These attachments increase the bucket weight 240, 290 and 325 lb., respectively. The new bucket is a single-line type which features the recently developed improvements in Blaw-Knox bucket construction. The roller gate design permits easily and absolutely controlled discharge of low slump concrete; it is equally suited to the handling of grout without leakage. Further information may be obtained by writing for the newly issued Blaw-Knox Catalog No. 1816. This booklet presents a comprehensive summary and operating story of all types of concrete buckets.

New Galvanized Sheet

A new galvanized sheet, known as Colorbond, just added to the list of products of the Newport Rolling Mill Co., Newport, Ky., is subjected to chemical and metallurgical processes that change the surface finish without in any way weakening the protective spelter coating. Instead, the galvanizing remains intact, unimpaired—a durable protection that safeguards the metal even after the coating has disappeared. As all painters know, fine finishing requires that a "tooth" be given each coat in order that succeeding coats may become an integral part of the finish rather than simply a layer of paint. Colorbond provides this "tooth."

Paint, enamel, varnish, lacquer and other finishes may be used on Colorbond with complete satisfaction. Colorbond, easily fabricated and formed without special tools, is made in three base metals: GOHI pure iron copper alloy; KCB copper steel, and in Globe brand steel. It is available in all sizes and gauges.

**Diesel Engines for Chevrolet
1½-Ton Trucks**

Hercules Diesel engines, fully engineered for Chevrolet Trucks, are available to replace the gasoline engines in both the Conventional and Cab-Over-Engine types of the 1½-ton chassis for 1940 and 1941. This is the same engine that is used by General Motors Overseas Operations in Diesel-powered Chevrolet Truck chassis for export. While the truck manufacturer does not offer Diesel-powered Chevrolet Trucks for the domestic market, these Hercules Diesel replacement engines are supplied to Chevrolet dealers by Hercules Motors Corporation through various distributors—and direct where no distributor setup is in operation.

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ELECTRIC TOOL****DRILLS • GRINDS • SANDS****SAWS • POLISHES****SHARPENS • CARVES**

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The new **WHIZ ELECTRIC TOOL** is the handiest power tool ever made. A rugged tool for power and precision work. Drills through ¼ inch iron plate in 42 seconds or engravings intricate designs. Handles any material: Metals—Woods—Alloys—Plastics—Glass—Steel—etc. Saves time. Eliminates labor. Plug into any socket AC or DC, 110 volts. Chuck ¼ inch capacity. Ball bearing thrust. Powerful triple-gearred motor. STANDARD MODEL, with Normal Speed (uses 200 different accessories, instantly interchangeable). Price only \$7.95.

The only DRILL-TOOL with a full year's guarantee.

FREE Accessory outfit (Value \$2) includes set of drills, mounted 1½ inch grinder, sanding discs, cutting wheels, mounted brush, polishing wheel, carving burr, etc. FREE with each tool ordered NOW. We pay postage.

10 Day Trial—Money Back Guarantee**PARAMOUNT PRODUCTS CO.**

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Easier operation and greater spread with Williams double hinge arrangement.

"WE FIND THE DOUBLE HINGE A DECIDED ADVANTAGE IN HARD DIGGING AND WET EXCAVATION."

Eugene F. Verga, Inc., New Jersey Contractors, writes:

"Your new type welded rolled steel constructed Multiple Rope Bucket is most satisfactory in every respect. In sewer excavation, the double hinge is a decided advantage due to longer spread of spades." The stronger, weight saving, welded construction and the many mechanical features developed in designing and building buckets since 1906, make Williams Buckets without a superior for hard service.

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THE FATE-ROOT-HEATH CO.
Plymouth, Ohio

The Favorite Mowing Unit for City,
County and State Highway Departments

**POWERS' CATALOG
COLUMN**

CHANGES in equipment specifications between Aug. 1 and Sept. 1 are shown below.

Austin-Western Road Machinery Co.

MOTOR GRADER "99" is superseded by Motor Grader "99-M," with specifications as follows:

Drive wheel type..... All wheel drive

Weight on Wheels—

Front 6,450 lb. (Gas.) 6,450 lb. (Diesel)

Rear 10,000 lb. (Gas.) 10,950 lb. (Diesel)

Shipping wt., lbs.... 16,450 (Gas.) 17,400 (Diesel)

Dimensions (overall)—length, 22'9¾"; width, 7'9¾";

height, without cab, 8'1½"; height, with cab, 9'8".

Blade assembly—L'n x W'd x Thick—13'x21"x3¾"; Blade base, 8'6"; Lifting mechanism—type, Hydraulic; speed, 1.7" per second; Control, Hydraulic.

Blade range—lift above ground, 16¾" side shift, 28" (11' by offsetting frame).

Road speeds—1st, 1.9; 2nd, 3.3; 3rd, 4.7; 4th, 7.9; 5th, 13.5; Reverse, 2.8.

Tire Equipment—front, 14.00x20; rear, 14.00x20.

Frame—shape, Box; size, 10"; weight per ft. (including boxing), 90 lb.

Circle diameter—5'2".

Blade pressure (lbs.)—without scarifier, 12,200 (Gas.) 12,150 (Diesel); without oval scarifier, 13,800 (Gas.) 13,950 (Diesel).

General dimensions—wheelbase, 7'6"; turning radius, 30'10"; tread—front 6'7", rear 6'7".

Rear Axle—construction, Rigid; axle diameter, 2½".

Front axle—construction, Differential; axle diameter, 2½".

Engine—	Gasoline	Diesel
Make and model.....	Buda K-428	I.H.C. UD-14
Fuel	Gasoline	Diesel
No. cyl., bore, and stroke.....	6—4¾"x4¾"	4—4¾"x6½"
Displacement (cu. in.)...	428	461
Max. BHP at gov. speed..	68.5	66.5
Piston speed (ft. per min.)	1,030	1,410
Lubrication	Pressure	Pressure
Main bearings—		
No. and dia.....	7—3"	5—3¼"
Area sq. in.....	108	106
Capacities—		
Fuel tank	40 gallons	40 gallons
Cooling system	9½ gallons	14 gallons
Scarifier—Type, Oval; Weight, 1,150 lb.; Swath width, 46"; No. teeth, 11; Size teeth, 1"x3"; Clearance above ground, 10½"; Pressure, 8,800 (Gas.), 8,850 Diesel).		

Huber Manufacturing Co.

Changes in Huber 5-ton to 8-ton rollers will be reported next month.

	Previous	Present
ROLLER (3-wheel) 10-ton size		
Shipping wt. with gas engine	20,350 lb.	20,000 lb.+*
Shipping wt. with diesel engine		21,000 lb.+*
Length with scarifier.....	239"	239"†
Width with 20" rear rolls...	75"	75"‡
Engine	Gasoline	Gas or Caterpillar D-4400
Steering	Hand-Hyd.	H-H or Dual**
Rear Roll width.....	20"	20 or 24"
ROLLER (3-wheel) 12-ton size		
Shipping wt.	24,100 lb.	24,000 lb.+*
Length with scarifier.....	239"	239"†
Width with 20" rear rolls...	75"	75"‡
Steering	Hand Hydro	H-H or Dual**
Rear Roll width.....	20"	20 or 24"
Rear Roll compression per lin. in. without scarifier (20" rolls)	388 lb.	420 lb.

International Harvester

The following changes are based upon Nebraska test, which had been applied for when Powers' specification tables were prepared in March, and was completed and made available in August.

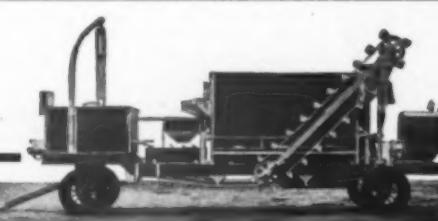
	Previous	Present
CRAWLER TRACTOR T-9—Gasoline		
Drawbar Horsepower	40	42.98
Belt Horsepower	48	48.69
Drawbar Pull (pounds)		
First Gear	9200	9868
Second Gear	6600	6904
Third Gear	4300	4556
Fourth Gear	3450	3650
Fifth Gear	2250	2434
Nebraska Test	—	No. 372

* With 24" rear rolls, the weight is about 1000 lb. greater.

** Operator can use either hand-hydraulic or power steering at will.

† Without scarifier the length is 219".

‡ With 24" rear rolls, the width is 83 in.

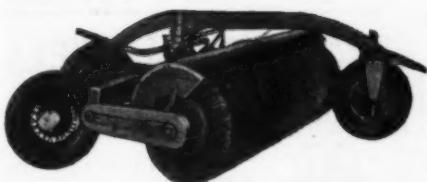


STREET REPAIR TRUCKS

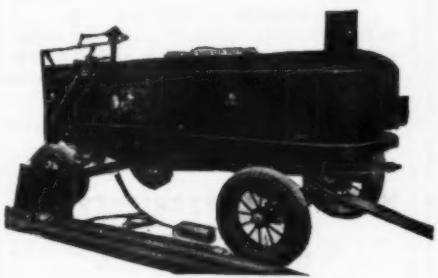
Portable Asphalt Plants—Dryers
Pug Mixers—Asphalt Kettles
Weed Burners—Torches

Write for Catalog

Elkhart White Mfg. Co., Indiana

GRACE

**2-WAY AXLE DRIVEN
SWEEPER
RAPID FIRE HEATER**



● Grace 2-Way Axle Driven Sweeper—the modern traction driven sweeper that successfully meets the sweeping problem of any contractor.

● Rapid Fire Heater—A fast-pumping, fast-heat circulating heater that heats 10,000-gallon insulated cars at 40-50° per hour. Write for information and prices.

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DALLAS

DO IT NOW



Buy your snow removal equipment now, so you will have it when needed. Ross snow plows with their "Sno-Flo" mouldboards will move more snow with less power. They "always come back from a finished job ready to go out on another."



Engineered and built by

The BURCH CORPORATION

Crestline, Ohio

Builders of Equipment for more than
Fifty Years

WITH THE MANUFACTURERS

G. C. Stephenson Made Sales Manager

G. C. Stephenson, of Pittsburgh, has been appointed sales manager for the Tar and Chemical division of Koppers Company, it is announced by J. N. Forker, vice-president of Koppers Company in charge of the Tar Chemical division.



G. C. Stephenson

he was a chemist and chief chemist at wood treating plants of the A. T. and S. F. railroad and chemist and superintendent at the Port Reading, N. J., creosote plant of the Reading Company. He was graduated from Lombard College, Galesburg, Ill., in 1920 with a bachelor of science degree in chemistry. He was born in Oneida, Ill.

Chain Belt Company Celebrates 50th Anniversary

On September 9th this year Chain Belt Company of Milwaukee completed fifty years of progress and achievement. Founded in 1891 for the purpose of producing an improved type of Detachable Chain, then used largely on agricultural machinery, it has since expanded its activities and is today recognized as one of the largest and best known producers of chain belts, construction machinery, elevating and conveying equipment and other related products. From a humble beginning it has, through consistent research and development work and the production of new products, gradually extended its markets as well as its lines. In normal times the company serves an unusually broad section of industry and there is hardly an industry with anything to be handled that does not use or cannot use some product made by Chain Belt Company.

Kotal Appoints Distributors

The Asphalt Treatment Corporation, 140 Cedar Street, New York, N. Y. have announced appointment of the following contractors who are now acting as suppliers and distributors of Kotal in their respective territories: The General Crushed Stone Company at Winchester, Massachusetts; Watertown, New York; Le Roy, New York; and Quakertown, Pennsylvania; C. W. Blakeslee & Sons, New Haven, Connecticut; Andresen Corporation, Niles Center, Illinois; Highway Utilities Company, Niles Center, Illinois; Skokie Asphalt Company, Skokie, Illinois; Drummond & Company, Pikesville, Maryland;



● Again Monotubes measure up to the emergency! 70,635 lineal feet of cast-in-place concrete piling was wanted in a hurry for the North American Aviation Company's new plant at Kansas City, Kansas. Monotubes were selected for the job and 1,500 of the 2,168 tapered steel casings required were driven, filled and ready for the foundation in two weeks' time.

Light weight for easy handling—faster driving because no mandrel is required—installation speeded through use of any crawler crane equipped with standard leads and hammer—quick, thorough inspection before filling with concrete—these are the Monotube features that are helping to produce quality piling on scores of time limit jobs today. Write for copy of Catalog No. 68A.



**THE UNION METAL
MANUFACTURING CO.**
CANTON, OHIO

CLEARING HOUSE

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now and for past 15 years manager of advertising department of \$13,000,000 manufacturer of machinery and tools, is available for similar position preferably in New York City or nearby locality. Has complete charge of trade paper advertising, preparation and production of catalogues, booklets, sales material, etc. Address Box 441, Roads and Streets, 330 So. Wells St., Chicago, Ill.

FOR SALE	
CRANE BOOM, 40', for Model 2 & 3 Northwest machines	\$ 400.00
BUCKET, dragline, $\frac{1}{2}$ yd. Page Automatic	450.00
BUCKET, dragline, 1 yd. Page Type M	400.00
BUCKET, dragline, 2 yd. Omaha heavy duty	800.00
CRUSHER, Cedar Rapids 9 x 36, plain bearing	1600.00
DRILL, SHARPENER, Sullivan Class C	400.00
GRADER, Adams No. 12, leaning wheel	500.00
RE-TREAD MIXER, PARSON TURBO	750.00
PAVER, 13E Koehring ($\frac{1}{2}$ yd.) on full crawlers, 20 ft. boom and bucket	1250.00
PILE HAMMER, No. 3 Vulcan	400.00
SCALE, Winslow 12 ton truck scale 18' x 9'	300.00
SCRAPER, 5 yd. Austin-Western cable scraper with winch and power take-off	1600.00
SHOVEL, $\frac{1}{2}$ yd. Inslay (half swing)	1500.00
SHOVEL, Koehring Model 401 ($1\frac{1}{4}$ yd.)	Price on application
SHOVEL ATTACHMENT for Model 4 and 5 Northwest machines	1500.00
TRACTOR, Caterpillar "30" with bulldozer	750.00
TRENCH MACHINE, Austin Model 150	4500.00
WAGON DRILLS, Cleveland DR-8 (latest model) with D-14 DR drifters	900.00

Offered subject to prior disposition.

O. B. AVERY COMPANY
1325 Macklind Ave. St. Louis, Mo.

REBUILT READY FOR IMMEDIATE SHIPMENT

All Located at Pittsburgh, Pa.

- 1—Austin-Western 10 ton Autocrat Roller completely rebuilt.
- 1—IHC PD80 International Diesel Engine.
- 1—15x20 Austin Western Jaw Crusher.

JOHN W. PATTERSON CO.
324 Fourth Ave. Pittsburgh, Pa.

Mack Construction Company, Pawtucket, Rhode Island; Black Top Roads, Inc., Harrisburg and Hollidaysburg, Pennsylvania; Halton Amiesite Construction Company, Mt. Vernon, New York.

Linn Appoints Homs Export Manager

One of the best known and liked men in the export line—J. M. Homs, with offices at 44 Whitehall Street, New York—was appointed export manager for The Linn Manufacturing Corporation as announced by Lee Bowler, sales manager, as of August 1st. Mr. Homs will take entire charge of all export sales.

Opens New York Office

Equipment Corporation of America announce the opening of offices in the Hudson Terminal Building in New York.

Equipment Corporation of America, originally a manufacturer of concrete mixers and similar equipment in Chicago, has undergone a steady expansion in the used equipment business. This caused them to give up their manufacturing business in 1928 and devote all of their energies and resources to supplying rebuilt equipment to engineers, contractors and industrial concerns with offices and rebuilding plants in Chicago, Pittsburgh and Philadelphia. The new office will handle machinery purchases, as well as selling and renting.

Buda Appoints Mexico and South American Export Managers

E. W. Heinrich, for many years connected with the export business of several U. S. A. companies, has been named a divisional export manager for the Buda Co. of Harvey (Chicago suburb). Mr. Heinrich will have charge of Buda's export business between Mexico and the equator. He is former divisional export manager for the Caterpillar Tractor Co. of Peoria, Ill., and Yale & Towne Mfg. Co. in Connecticut, is a graduate of Yale University, and comes from Atlantic City, N. J. George H. Koons, division export manager for Buda for many years, will have as his territory everything in South America below the equator and will establish headquarters at Rio de Janeiro and later in Buenos Aires. R. B. Anderson, manager of the export division of Buda, points out that his company has decided to place great emphasis upon the development of business in Latin-America, where the demands at present are very great for railway supplies, diesel and gas engines and such material as Buda produces. Koons formerly represented Buda in Europe, he has spent the last summer and autumn in South America. Heinrich has had extensive experience in Central and South America.

DeLong Made Operating Manager Mechanical Sales Division of Goodrich

Clyde DeLong has been named operating manager of the mechanical sales division of The B. F. Goodrich Company, it is announced by W. S. Richardson, general sales manager. DeLong was graduated from Miami University at Oxford, O., in 1927 with a Bachelor of Science degree. He joined B. F. Goodrich in January, 1928, as a clerk in the mechanical division fac-

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New or Rebuilt Sale or Rent

Headquarters for REPAIRS — any make. Factory Service. We will also buy your old instruments or take them in trade.

A complete line of Engineering Instruments and Equipment for Field or Office. Write for Bulletin RS 69.

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Hall-Perry Machinery Co.

812 E. Iron St.
BUTTE, MONTANA

EQUIPMENT AND SUPPLIES FOR:

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Mines
Mills
Municipalities

We will be glad to figure on equipment and supplies for any job.

FOR SALE:

30 x 10 Portable CRUSHING PLANT
4 x 8 Telsmith Vibrating SCREEN
1 Ton Cap. ASPHALT PLANT
3-800 x 1,000 Gal. DISTRIBUTORS
18 in. x 200 ft. BELT CONVEYOR
5-RD-6, 7, 8 DIESEL TRACTORS
1/2 yd. Owen CLAMSHELL
10 Ton Tandem ROLLER
2-1,000 ft. DIESEL AIR COMPRESSORS
30-1/2 yd. and 3 yd. DUMP CARS
6 ORANGE PEELS—6 to 27 ft.
100 H.P. Lambert three drum ELEC. HOIST
5 Persons & Cleveland TRENCHERS
2-2 1/2 and 3 ton tandem gas ROLLERS

Tidewater Equipment & Machy. Corp.
305 Madison Ave. New York, N. Y.

FOR SALE OR RENT

HEAVY GRADING EQUIPMENT

- 1—Model KO 54 AC speed patrol grader.
- 1—Model 10-K Ryan pull grader.
- 1—No. 14 AC power controlled pull grader.
- 1—10-ton Huber roller, gas engine power.
- 1—10-ton Buffalo steam roller.
- 1—4 to 5 yard Atco hydraulic scraper.
- 1—Model L tractor.
- 1—Model LO Allis-Chalmers tractor.
- 1—Model K Allis-Chalmers tractor with dozer.

USED TRACTOR PARTS

Large assortment parts for Models L and LO Allis-Chalmers and 60 and 65 Caterpillar, including transmissions, gears, sprockets and motors. Write for our complete used equipment list.

GENERAL MACHINERY COMPANY
SPOKANE, WASHINGTON

CLEARING HOUSE**FOR SALE**

7—Euclid bottom dump wagons mounted on crawler tracks, 8 cubic yard capacity.
 4—Athey 8 cubic yard bottom dump wagons mounted on 12 x 24 dual pneumatic tires.
 2—Athey 8 cubic yard bottom dumps mounted on 44 x 10 dual pneumatic tires.

All in first class order. Now stored at supply depot of

I. L. WHITEHEAD, Contractor
Telephone 2204
SAULT STE. MARIE, MICHIGAN

FOR SALE

Two Driers—22 ft. long, 66" Diameter.
 One—5 ton Shop Crane 7 ft. Span, hand operated.

THE BARBER CONSTRUCTION CO.
5001 ELSTON AVE., CHICAGO

FOR SALE

Thirty Caterpillar and 8' ft. Adams Grader, \$400.
 110 Sullivan Air Compressor, Cleveland Hammer Drills & Hose, \$475.
 916 Cedar Rapids Crusher, Elevator, Screens & Bin, \$1200.

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1622 Nelson Ave. Dayton, Ohio

SPECIALIZED SERVICES**TIRES REPAIRED**

18.00x24 down to wheelbarrow size.
 Full line of new and used tires.

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POSITION WANTED

POSITION WANTED—Construction Supt. Over 20 years experience in road building all types—both highway and city—grading, culverts, drainage, catch basins, manholes, curb, curb and gutter. Everything pertaining to road building construction. **Box 436, Roads and Streets, 330 So. Wells St., Chicago, Ill.**

GENERAL MANAGER—Forceful, capable executive, twenty years experience in construction of all types roads, bridges, sewers, etc., seeks position as general manager for contracting firm. Expert in the preparation of bids, contracts, purchasing, organization and control of heavy construction projects. Ideal man for bank or heirs. Willing to work on percentage basis. Available on short notice, willing to go anywhere. **Box 435, Roads and Streets, 330 So. Wells St., Chicago, Ill.**

POSITION WANTED—Experienced operator and service man on all types of road machinery. 16 years experience. Married with family. Draft exempt. Prefer work in Missouri but would go anywhere. Can furnish good references. **Box 434, Roads and Streets, 330 So. Wells St., Chicago, Ill.**

tory offices, where he served six years until transferred to the heel and sole sales department in 1934. He stayed in that work three years. After two years as a mechanical goods salesman in the Chicago district he was named assistant operating manager in 1939 and a year later was transferred to the New York district sales force, where he called on the oil and railroad industries. DeLong succeeds F. A. Lang, who has been transferred to the management of heel and sole sales.

Security Metal Products Co.
Moves Plant

The offices and plant of the Security Metal Products Co., Inc., manufacturers of Security locking nut, have been moved from Kalamazoo to Saugatuck, Mich.

NEW TRADE LITERATURE

Heavy Duty Trenchers.—The 200 Series Buckeye Heavy Duty Trenchers are described in Bulletin No. 7B-200. These machines which speedily excavate large trench for intercepting sewers, large mains, street underpasses and other purposes are shown at such work in the illustrations. A copy of Bulletin No. 7B-200 will be sent on request by the Buckeye Traction Ditcher Co., Findlay, Ohio.

Electric Tool.—A folder describing a small hand tool which with its accessories will drill or grind or can be used to sharpen tools, sand wood surfaces and many other operations too numerous to mention has been received recently. A complete description of the unit and its many applications, together with specifications, are included. Copies can be secured from the manufacturer, Paramount Products Co., 545 Fifth Ave., New York, N. Y.

Maintenance Tool.—Bulletin P&P-41, just issued by Templeton, Kenly & Co., brings up to date application data that has been gathered on the Util-A-Tool, for which new uses are frequently reported. This handy tool consists of 9 pieces of equipment used in various combinations to perform various jobs. Specifications and prices are also given.

Tractor Shovel.—Trackson Company's new catalog on the "Traxcavator" is illustrated with 37 field photos to emphasize new methods that are being employed in many industries to achieve speed and economy in material handling. A copy can be had by writing to the manufacturer or to this magazine.

Body Hoists.—Gar Wood Bulletin No. 29, now being distributed, illustrates and describes the new Gar Wood arm type hydraulic hoists. These hoists involve a new type of lifting arrangement. They are recommended for installation on 1½- and 2-ton chassis. When writing for Bulletin 29, address Gar Wood Industries, Inc., Hoist and Body Division, Detroit, Mich., and mention ROADS AND STREETS.

Snow Plows V-Type.—Among catalogs recently issued is one by Carl H. Frink and Davenport Besler Corporation which covers the manufacturers' line of V-plows and wing attachments in 24 well illustrated pages. For a copy write to this magazine asking for Catalog 41DB.

CLEARING HOUSE

EQUIPMENT FOR SALE
TRACTORS

Cletrac "DDH" Hillside Model Tractor No. 1-L-3082 with Hercules Diesel 61 H.P. motor, 18" tracks, overhauled and in very good condition. Cat. "60" Tractor in operating condition.

EARTH HANDLING EQUIPMENT

Austin-Western 5 yard cable scraper, good condition. Austin-Western winch for above scraper, to fit any standard crawler tractor.

Atco 5 yard scraper with hydraulic attachments for Cat. "60". Good condition.

Ball Wagon, 3 yard, working condition. Page 1½ yard dragline bucket complete, reconditioned and in excellent condition. Painted red.

Austin Western 30 Ft. crane boom for Badger Shovel with fairleads in good condition. Painted red.

GRADERS

Ryan 12 Ft. Grader, power controlled, leaning frame, steel tired roller bearing wheels, in operating condition.

Adams 8 ft. Grader with good solid rubber tires, roller bearing wheels, painted yellow. Good condition.

CRUSHING EQUIPMENT

Simplicity 2 deck screen, 3' x 6' without screen cloth, painted gray, excellent condition.

Niagara 2 deck 3' x 8' screen with 1" and 1½" cloth on top deck, ¾" screen cloth on bottom deck. Rebuilt with new bearings. Excellent condition.

Austin-Western 32" x 14" revolving screen with 4 ft. sand jacket. Will be rebuilt and sold with guarantee.

Manitowoc 6" centrifugal pump, high head, triple stage, capacity 600 gal. per minute at 150 ft. head. Mounted on steel skids with factory rebuilt Hercules 50 H.P. motor, 4 cyl. Painted red and in excellent condition.

Waukeisha 4 cyl. 40 H. P. Power unit complete with clutch, 10" pulley with Gates No. 210-C "V" belts. Painted yellow, very good condition.

LeRoi 4 cyl. Power unit on skids, Motor No. 80095, with 2 to 1 reduction gear and clutch, hood sides. No pulley. Painted yellow. In new condition.

No. 105 Austin Gyrotary Crusher with back gear on steel tired trucks. Excellent condition.

TELFORD EQUIPMENT CO.
735 E. Kalamazoo St., Lansing, Michigan

EQUIPMENT FOR SALE

FOR SALE—2 "Caterpillar" D6 tractors with LaPlant-Choate bulldozers, 2 standard gauge "Caterpillar" D6 tractors, 3 "Caterpillar" 35 gas tractors. All of above tractors reconditioned and in first class shape. **Address Box 442, Roads and Streets, 330 So. Wells St., Chicago, Ill.**

FOR SALE—1 Model L 4 Nelson Bucket Loader, mounted on caterpillar treads, purchased new September, 1940. A Bargain. Located in Kansas. **Address Box 437, Roads and Streets, 330 So. Wells St., Chicago, Ill.**

FOR SALE—1 Model 24B Barber-Greene Flight Coal Loader, mounted on caterpillar treads, with shaker screen. Equipped with four cylinder gasoline engine. Located in western Missouri. **Address Box 438, Roads and Streets, 330 So. Wells St., Chicago, Ill.**

FOR SALE—1—9" x 36" Universal Jaw Crusher, mounted on 4 wheel steel truck with bucket elevator. A real bargain. Located in southern Missouri. **Address Box 439, Roads and Streets, 330 So. Wells St., Chicago, Ill.**

FOR SALE—Caterpillar tractors, excellent rebuilt condition: 50 diesel, 60 and 22 gas. Koehring Dandie Concrete mixer, 10S. 2 12-foot motor graders. Clifford Waterhouse, P. O. Box No. 172, Jackson, Mississippi. Phone 2-0617.

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Crushers	Bins	Drag-Lines
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Screens	Spreader	Air Separators
Wash Boxes	Kettles	
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Each with bath from \$3.00 up
RADIOS IN EVERY ROOM
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Machine on the job. 3 sizes:
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UNADILLA, NEW YORK

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